12-18
Iro

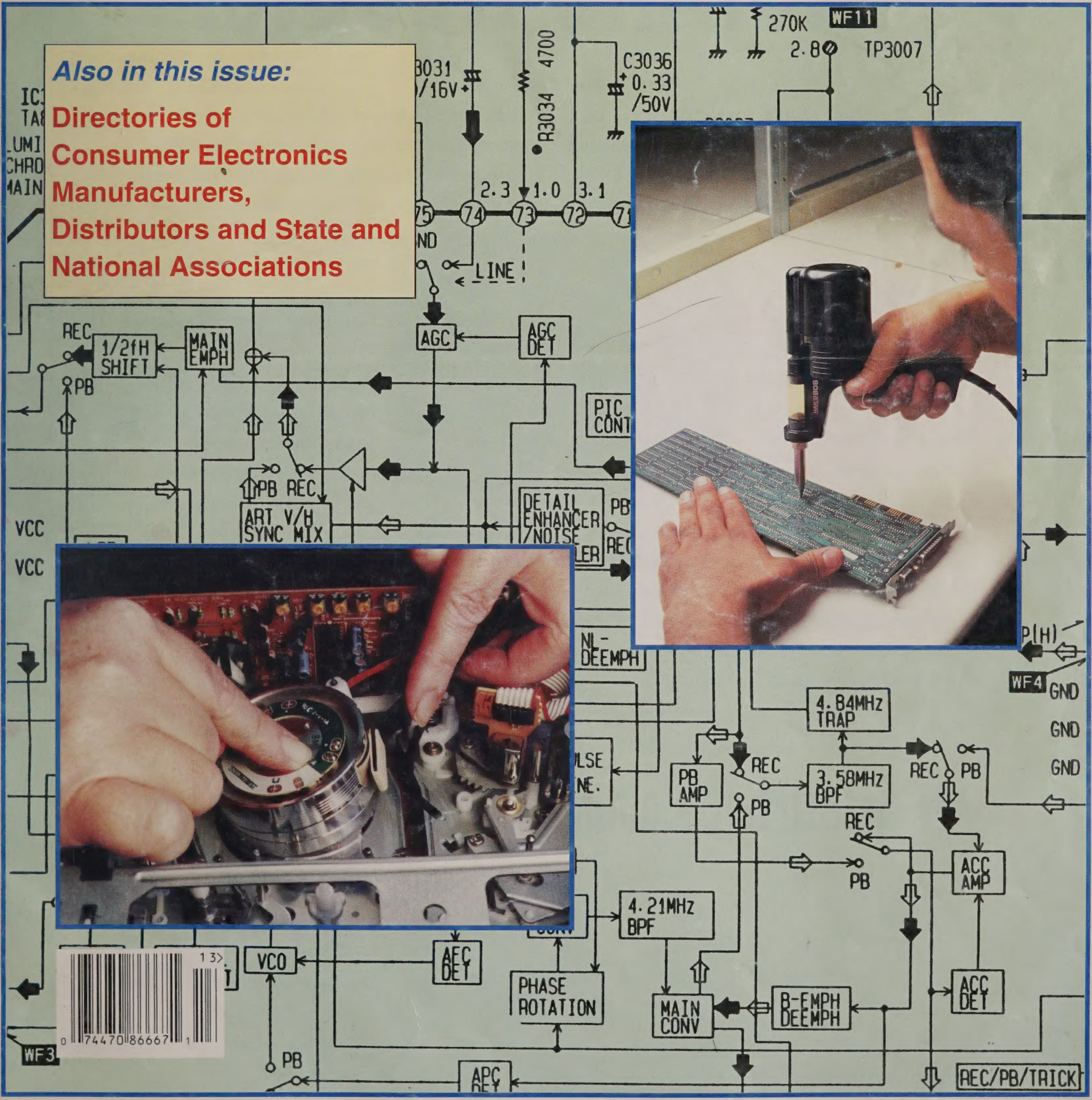
THE PROFESSIONAL MAGAZINE FOR ELECTRONICS AND COMPUTER SERVICING

ELECTRONIC™
Servicing & Technology

1995/1996 Profax Schematic Special/$3.00

Profax Schematics Special

• **Panasonic** • **JC Penney** • **Sharp** • **Thomson** • **Toshiba** • **Zenith** •

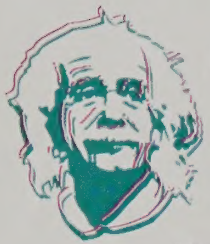


Also in this issue:

Directories of Consumer Electronics Manufacturers, Distributors and State and National Associations

1 3>
0 74470 86667 1

Lose the Haystack, Not the Needle.

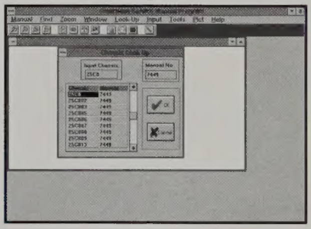


Just think, instant access to a specific diagram, chassis, or schematic. Searching for information is no longer like searching for a needle in a haystack. Avoid the frustration and wasted time with SmartMan. Click a button, and you'll locate necessary information in less time than it takes to read this ad.

SmartMan is easy to use, convenient, and adapts to your specific needs. And as you discover solutions to various problems, SmartMan will store each solution with the correct chassis, so you can utilize that information again in the future.

Locate the latest information–from supplements to troubleshooting tips–quickly and easily. Available updates keep you up-to-date without the hassle of paper supplements because you'll store selected manuals and supplements directly on the hard drive of your computer.

Plus, SmartMan makes house calls! Simply load SmartMan onto your notebook computer, and you're ready to take the whole reference library on the road. Take the notebook on your next service call and find important information instantly!



A simple interface and helpful pull-down menus give you easy access to servicing information.

SmartMan. Coming soon to a PC near you.

PHILIPS

THE PROFESSIONAL MAGAZINE FOR ELECTRONICS AND COMPUTER SERVICING

ELECTRONIC
Servicing & Technology

Electronic Servicing & Technology is edited for servicing professionals who service consumer electronics equipment. This includes service technicians, field service personnel and avid servicing enthusiasts who repair and maintain audio, video, computer and other consumer electronics equipment.

EDITORIAL

Nils Conrad Persson, *Editor*
Kirstie Wickham, *Associate Editor*

PRODUCTION

Elizabeth Ryan, *Art Director*
Barbara Terzo, *Associate Art Director*
Susan Oliveri, *Assistant Art Director*
Dorothy Kehrwieder, *Production Manager*
Emily Kreutz, *Assistant Production Manager*
Edmond Pesonen, *Electronic Comp. Manager*
Pat Le Blanc, *Electronic Composition*

BUSINESS

Richard A. Ross, *Publisher*
John Dorr, *General Manager*
Frank V. Fuzia, *Controller*
Catherine Ross, *Circulation Director*
Melissa Nitschke, *Data Processing Manager*
Denise Pyne, *Customer Service*

SALES OFFICE

Electronic Servicing & Technology
76 N. Broadway, Hicksville, NY 11801
516-681-2922; FAX 516-681-2926

Diane G. Klusner, *Director of Advertising*
Emily Kreutz, *Sales Assistant*

NESDA
Member, Electronic Servicing Dealers Association

EDITORIAL CORRESPONDENCE
P.O. Box 12487
Overland Park, KS 66212
913-492-4857

Electronic Servicing & Technology (ISSN 0278-9922) is published 13 times a year by CQ Communications, Inc., 76 N. Broadway, Hicksville, NY 11801. Telephone (516) 681-2922. Second class postage paid at Hicksville, NY and additional offices. Subscription prices (payable in US dollars only): Domestic—one year $24.75, two years $45. Foreign countries—one year $30.75, two years $57. Entire contents copyright 1995 by CQ Communications, Inc. Electronic Servicing & Technology or CQ Communications, Inc. assumes no responsibility for unsolicited manuscripts. Allow six weeks for delivery of first issue and for change of address. Printed in the United States of America.

Postmaster: Please send change of address notice to Electronic Servicing & Technology, 76 N. Broadway, Hicksville, NY 11801.

CQ Communications, Inc. is publisher of CQ The Radio Amateur's Journal, Popular Communications, ComputerCraft, CQ Radio Amateur (Spanish CQ), CQ Amateur Radio Equipment Buyer's Guide, CQ Beginner's Guide to Amateur Radio, Popular Communications Communications Guides, CQ VHF, CQ Contest, and Electronic Servicing & Technology.

1995/1996 Profax Schematics Special

Table of Contents

About the 1995/1996 Profax Schematic Special 2
Consumer Electronics Manufacturers 2
Consumer Electronics Distributors 5
Consumer Electronics National Associations 7
Consumer Electronics State Associations 8

Panasonic TV Model No. CTM-2092S Chassis ALEDP203

EF&X 10,11
AC&L Board 12,13

JC Penney TV Model No. 2157

Entire Schematic 14,15

JC Penney TV Model No. 2294

Entire Schematic 16,17

Sharp TV/VCR Combo Model 20VT-G60, 20VT-G100, 20VT-G200

Overall Schematic Diagram 18
Main Unit 19
VCR Unit (Power Circuit) 20
VCR Unit (Sys. Cont/Servo) 21
VCR Unit (Y/C and Audio) 22

Sharp VCR Model No. VC-H946U, VC-H948U

Main circuit (1) and Operation Circuit 23
Main Circuit (2) 24
Main Circuit (3) (Power Section) 25
Main Circuit (4) 26
Cable Box Control and First AV Circuit 27

Thomson VCR Model No. VR516

Servo 28,29
Luma/Chroma 30,31
Preamp/Head Switch 32,33
Power Supply 34

Thomson Color Video Camcorder Model No. CC525, CPS014, CPS015

Servo 35
Luma/Chroma 40,41
System Control 38,39
Audio 36,37

Thomson TV, AM Radio Cassette Combination Model No. 7-7800A

TV Chassis 42-43, 44-45
AM/FM Radio, Cass., Gr. Eq., Headphone, Power 46,47

Toshiba TV Model No. CF2771A

Main Board 48,49
CRT Drive Board, A/V Board 50,51

Zenith Projection TV L-Line C-8 Chassis

Entire Schematic 52,53

Zenith Color TV Receiver Model No. SD2501W, SD2509H

Entire Schematic 54,55

THE PROFESSIONAL MAGAZINE FOR ELECTRONICS AND COMPUTER SERVICING
ELECTRONIC
Servicing & Technology

1995/1996 Profax Schematics Special Issue

A schematic diagram provides the servicing technician with valuable information. In a way, it does for the technician what a road map does for a driver; it shows how things in the product are connected and how to get from point A to point B.

But, it's important to keep in mind that a schematic is very different from a road map. On a road map, the physical arrangement of cities, states and roads is a replica of the actual arrangement of those entities on the surface of the earth. On a schematic diagram, on the other hand, the physical arrangement of components and interconnecting wires is often distorted. The important thing on a schematic is not how the elements are related *physically*, but how they're related *electrically*. Thus while two components may be at a considerable distance apart, physically, they may be represented on the schematic diagram as being near each other.

Schematics increasingly complex

Consumer electronics products have increased greatly in complexity over the past few decades. There was a time when the circuitry of most TVs could be included in a schematic diagram that took up a page or two. Schematic diagrams of modern complex sets with all of the bells, whistles, cable ready, picture-in-picture, stereo audio with SAP (second audio program), remote control and more, typically take up page after page of a schematic diagram.

And, if you think about it, the internal complexity of the set is really greater than that. The schematic diagram is showing outlines of ICs, with their huge numbers of pins. But each of those ICs may actually include tens or hundreds of components fabricated in a single piece of silicon.

You can't tell the players without a program

Because sets are so complex, and additionally because many of the functions in modern sets are performed by microprocessors whose operation is unfathomable without access to the documentation, it becomes increasingly difficult to service consumer electronics products without the manual, or at least the schematic diagram.

Of course, just as with older sets, some problems can be corrected without recourse to the service documentation. For example, a blown fuse, a burned horizontal output transistor, or other such problems may in some cases be quickly found and repaired. More subtle problems may be all but impossible to correct without the schematic.

Another complication that frequently increases service difficulty is finding out how to get some of the modern sets into the service mode. On many sets it requires pressing a combination of keys on the keypad. Unfortunately, the correct combination of keys is usually anything but obvious.

Here are some schematics

One of the things that **ES&T** has done over the years to try to help technicians service consumer electronics products is to include schematic diagrams in each of our monthly issues.

Back in the golden days of consumer electronics service it was possible to include schematics for several products in a single issue. Unfortunately, as products become more complex, not only is it not possible to include the schematic diagram of more than one product, sometimes we can only include a portion of a single set in a given issue. For that reason, we now publish this annual Schematics Special Issue. It allows us to bring readers a few more schematic diagrams than we are able to do in just our monthly issues, and brings them together in one place. We hope that you find them useful.

Give us a call

This special issue is published for our readers. We have tried to make it as valuable as possible. Please do us a favor. If for any reason you feel that we could make this special issue more useful, let us know. If you would prefer that we publish schematics from some other manufacturers, let us know. If you would prefer that we publish schematics of some other products, let us know. If you think it would be more useful to include other portions of the circuitry where we have not included the circuits of an entire product, tell us. Please write, call or e-mail us at:

Conrad Persson, Editor
Electronic Servicing & Technology
PO Box 12487
Overland Park, KS 66282-2487
913-492-4857
cpersedit@aol.com/

Consumer Electronics Manufacturers

Acoustic Research (AR)
330 Turnpike Street
Canton, MA 02021
617-821-2300
Fax: 617-784-4102

Adcom Service Corporation
11 Elkins Road
East Brunswick, NJ 08816
908-390-1130
Fax: 908-390-9152

AIWA America Inc.
800 Corporate Drive
Mahwah, NJ 07430
201-512-3600
Fax: 201-512-3705

Akai American, Ltd. - See Mitsubishi

Alpine Electronics of America, Inc.
19145 Gramercy Place
Torrance, CA 90501
310-326-8000
800-421-2284
Fax: 310-782-0726

Altec Lansing Consumer Products
P.O. Box 277
Milford, PA 18337
717-296-4434
800-258-3288 (ext PA)
Fax: 717-296-2213

AmPro Corporation
(Replacement parts for Kloss Novabeam and Videobeam)
5 Wheeling Ave.
Woburn, MA 01801
Sales: 617-932-4800
Fax: 617-932-8756

AOC International
311 Sinclair Frontage Rd.
Milpitas, CA 95035
408-956-1070
Fax: 408-956-1516

Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
408-996-1010
Fax: 408-996-0275

Aristo Computers Inc.
6700 SW 105th Ave., Suite 307
Beaverton, OR 97005
503-626-6333
800-3ARISTO

Atari Corp.
1196 Borregas Avenue
Sunnyvale, CA 94086
Parts: 408-745-5501
Tech: 408-745-2098/2166
Warr: 408-745-2051

Audio Technica U.S., Inc.
1221 Commerce Drive
Stow, OH 44224
216-686-2600
Fax: 216-688-3752

Audio Video Technologies Inc.
60 E. Ida
Antioch, IL 60002
708-395-6321

Audiovox Corp.
150 Marcus Drive
Hauppauge, NY 11788
516-231-7750
Fax: 516-434-3995

Barcus-Berry, Inc
5381 Production Drive
Huntington Beach, CA 92649
714-898-9211
800-854-6481

Blaupunkt
PO Box 4601
Carol Stream, IL 60197-4601
708-865-5200
Fax: 708-865-5209

BSR
C/O Warranty Central
8130 Remmett Ave.
Canoga Park, CA 91304
213-689-9188

Canton North America, Inc.
915 Washington Avenue South
Minneapolis, MN 55415-1245
612-333-1150
Fax: 612-338-8129

Capetronics USA Inc.
150 East 58th St., 29th Floor
New York, NY 10155-2998
212-832-1331

Casio Inc.
570 Mt. Pleasant Ave.
Dover, NJ 07801
201-361-5400
Fax: 201-361-3819

Channel Master
P.O. Box 1416; Industrial Park Drive
Smithfield, NC 27577
919-989-2205
Fax: 919-989-2200

Chinon America, Inc.
615 Hawaii Ave.
Torrance, CA 90503
310-533-0274
Fax: 310-533-0274

CIE American, Inc.
2515 McCabe Way
PO Box 19663
Irvine, CA 93713
714-833-8445
Fax: 714-757-4488

Consumer Electronics Manufacturers

Citizen American Corp.
Subsidiary of Citizen Watch Co.
2450 Broadway, Suite 600
Santa Monica, CA 90411
310-453-0614
Fax: 310-453-2814

Clarion Corp. of America
661 W. Redondo Beach Blvd.
Gardena, CA 90247-4201
310-327-9100
800-821-6693
Fax: 310-327-1999

Columbia Data Products
P.O. Box 142584
Altamonte Springs, FL 32714
407-869-6700

Commodore International Ltd.
1200 Wilson Drive
West Chester, PA 19380
215-431-9100
Fax: 215-431-9465

COMPAQ Computer Corp.
20555 SH 249
Houston, TX 77070
713-370-0670
Fax: 713-374-1740

Connecticut Microcomputer
568 Danbury Road
New Milford, CT 06776
203-354-9395
Fax: 203-355-8258
800-426-2872

Craig Consumer Electronics
13845 Artesia Blvd.
Cerritos, CA 90701-5001
310-926-9944
Fax: 310-926-9269

Curtis Mathes Corp.
10911 Petal Street
Dallas, TX 75238
800-657-1979
Fax: 214-503-8515

Daewoo Electronics Corp. of America
100 Daewoo Place
Carlstadt, NJ 07072
201-935-8700
Fax: 201-935-6491

Dell Computer Corp.
2214 W. Braker Lane
Austin, TX 78758
Sales, Parts and Warranties: 800-426-5150
Service: 800-624-9896

Denon America, Inc.
222 New Road
Parsippany, NJ 07054
201-882-7490
Fax: 201-575-2532

Design Acoustics
An Audio-Technica Company
1225 Commerce Drive
Stow, OH 44224
216-686-2600
Fax: 216-688-3752

Eastman Kodak
343 State St.
Rochester, NY 14650
716-724-4000

Electronic Systems Products, Inc.
525 N. John Rodes Blvd.
Melbourne, FL 32934-9103
407-269-6680
Fax: 407-267-6211

Emerson Radio Corp.
9 Entin Road
Parsippany, NJ 07054
201-884-5800

Epson America, Inc.
20770 Madrona Ave.
Torrance, CA 90509-2842
310-782-0770
Fax: 310-782-5220

Fujitsu Ten Corp. of America
National Service Headquarters
19600 South Vermont St.
Torrance, CA 90502
800-423-8161

Funai USA Corporation
(Also Symphonic)
100 North Street
Teterboro, NJ 07608
201-288-2666
Fax: 201-288-0239

GE Appliances/Microwave Products Dept.
Appliance Park
Bldg. 41, Rm. 106
Louisville, KY 40225
502-452-3568

Gemini, Inc.
103 Mensing Way
Cannon Falls, MN 55009
507-263-3957

GoldStar Electronics Int'l, Inc.
201 James Record Rd.
Huntsville, AL 35824-0166
205-772-8860
Fax: 205-772-8987

Grundig/Lextronix Inc.
3520 Haven Ave., Unit L
Redwood City, CA 94063
415-361-1611
Fax: 415-361-1724

Harmon Kardon, Inc. - JBL
240 Crossways Park West
Woodbury, NY 11797
516-496-3400

Heath Company/
Heath-Zenith Consumer Products Group
PO Box 1288
455 Riverview Dr.
Benton Harbor, MI 49022
616-925-6000
Fax: 616-925-2898

Hewlett-Packard
3000 Hanover St.
Palo Alto, CA 94304
415-694-2000

Hitachi Home Electronics (America), Inc.
675 Old Peachtree Rd.
Suwanee, GA 30174
404-279-5600
Fax: 404-279-5692
Parts Center
401 West Artesia Blvd.
Compton, CA 90220
310-537-8383

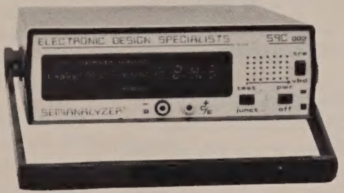
INTV Corp.
3541 B Lomita Blvd.
Torrance, CA 90505
310-539-1940

International Jensen Inc.
25 Tri-State Int'l Ofc. Ctr., Ste 400
Lincolnshire, IL 60069
800-323-0221
Fax: 708-317-3826

JVC Service & Engineering Co. of America
Division of U.S. JVC Corp.
107 Little Falls Rd.
Fairfield, NJ 07004-2105
201-808-2100

ELECTRONIC DESIGN SPECIALISTS

Dedicated to the progressive technician who knows that using the right test equipment yields the most productivity. For the rest of you, EDS will try to drag you Kicking and Screaming into this and the next century with our "Kicking and Screaming" sale...



"The SEMIANALYZER is the most complete test equipment on the bench"
-R. Hohl, GMC Corp, MI

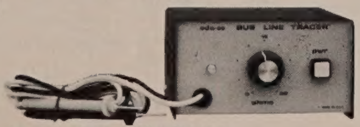
o Traces video, audio, digital signals from 1mv to 50v while displaying DC Volts.
o Displays breakdown voltage of zeners, semi-conductors, capacitors, LEDs, neons, etc. while measuring leakage and noise.
o Checks and identifies semiconductor junctions in circuit, displays status on LED display with audible beeptones.
o Normally $399, "Kicking and Screaming" sale price $349 until 3/31/96.

"The MICROANALYZER sure helps on those tough jobs"
-Sears Roebuck Service, IL

If you fix microwaves, you know that the HV components cannot be checked properly with a multimeter. The MICROANALYZER checks components under high voltage stress, transformer windings are checked INDUCTIVELY for the best accuracy.

o In circuit HV stress test for HV diode, capacitor, transformer, magnetron.
o Measures up to 5000V AC or DC in two ranges with overload protection.
o Checks triacs, transistors, scrs and mosfets.
o Normally $349, "Kicking and Screaming" sale price $299 until 3/31/96.

Ever have a shorted power supply line that connects to hundreds of other components? Remember unsoldering and testing every suspicious part, one by one until you found it? You need to get a BUS LINE TRACER !



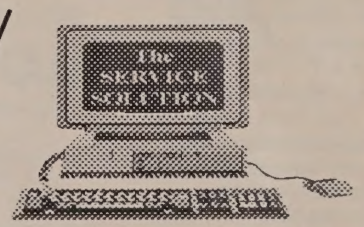
o Traces shorted (or leaky up to 30 ohms) components to the exact location on PCB.
o Beeps higher as you get closer, beeps lower as you get furthur from the defect.
o Normally $129, "Kicking and Screaming" sale price $99 until 3/31/96.

60 day "satisfaction or money-back" guarantee

VISA 4647 Appalachian St. Boca Raton, FL 33428 MasterCard DISCOVER
PHONE/FAX (407) 487-6103

COMPLETE SERVICE MANAGEMENT SOFTWARE DESIGNED FOR PROFESSIONAL SERVICERS' LIKE YOU !

Go from this ...



... to This !

Fast! Powerful! Affordable!

LET US SHOW YOU HOW TO GET THE FACTS ON ANY ASPECT OF YOUR BUSINESS QUICKLY & EASILY.

WE'LL SEND YOU A FREE,* NO OBLIGATION, DEMONSTRATION COPY OF "THE SERVICE SOLUTION" SOFTWARE PACKAGE.

* $ 5.00 s/h. Refunded on Order

For more information, give us a call today !

RAM Software Enterprises

800 323-9654

Consumer Electronics Manufacturers

Kawasho International
(Kawasho is no longer importing TV sets into the U.S., but some parts and service information is available from:)
Factory Service
PO Box 747
Buffalo, NY 14240
716-856-1612
Kawasho flybacks are also available from:
Electro Dynamics (General line distributor)
135 Eileen Way
Syosset, NY 11791
800-426-6423

Kaypro Corporation
101 W. Broadway #400
San Diego, CA 92101-8205
619-535-2155
Fax: 619-535-2170

Kenwood U.S.A., Corp.
PO Box 22745
Long Beach, Ca 90810-5745
310-639-9000
Fax: 310-609-2127

Kloss Video Corp.
See Ampro Corp.

KTV Inc.
205 Moonachie Road
Moonachie, NJ 07074
201-440-9090
Fax: 201-440-6557

Kyocera Electronics, Inc.
100 Randolph Rd.
Somerset, NJ 08875
908-560-0060

Lloyd's Electronics, Inc.
National Parts
6500 West Cortland St.
Chicago, IL 60635
312-889-8870
Fax: 312-889-6797

Luxman Electronics Corp.
915 Washington Avenue S.
Minneapolis, MN 55415
612-333-1150
Fax: 612-338-8129

Marantz America, Inc.
440 Medinah Road
Roselle, IL 60172
708-307-3100
Fax: 708-307-2687

Matsushita Services Co.
50 Meadowland Parkway
Secaucus, NJ 07094
201-348-7000
Fax: 201-348-7527

Mattel, Inc.
See INTV

Micro Palm Computers
316 Daniel Webster Hwy.
Merrimack, NH 03054-4115

Midland International Corporation
1690 North Topping
Kansas City, MO 64120
816-241-8500
800-MIDLAND

Mitsubishi Electronics America, Inc.
National Service Department
5757 Plaza Drive
PO Box 6007
Cypress, CA 90630-0007
714-220-2500

NAD (USA) Inc.
633 Granite Court
Pickering, Ontario
Canada L1W 3K1
416-831-6333
Fax: 416-831-6936
800-263-4641

NEC Technologies Inc.
Consumer Electronics and Computer Products Divisions
1255 Michael Drive
Wood Dale, IL 60191-1094
708-860-9500
Fax: 800-356-2415

Nikko
AVS Technologies
2100 Trans-Canada Highway South
Montreal, Quebec
Canada H9P-2N4
514-683-1771
Fax: 514-683-5307

Okidata
532 Fellowship Road
Mount Laurel, NJ 08054
609-235-2600
800-OKIDATA

Onkyo U.S.A. Corp.
200 Williams Drive
Ramsey, NJ 07446
201-825-7950
Fax: 201-934-1845

Orion Sales Inc.
11 Union Drive
PO Box 10
Olney, IL 62450
618-392-7000
Fax: 618-392-7100
Service manager is Roy See

Ortofon, Inc.
65 East Bethpage Rd.
Plainview, NY 11803
516-454-6570
Fax: 516-454-6515

Penney, J.C.
National Parts Center
6840 Barton Road
Morrow, GA 30260
404-961-8408
800-933-7115

Philips Consumer Electronics Company
Philips Service Company
PO Box 555
401 Old Andrew Johnson Highway
Jefferson City, TN 37760
615-475-8869
Replacement Parts/Service Literature
800-851-8885
Fax: 800-535-3715

Pioneer Electronics Service, Inc.
1925 East Dominguez St.
PO Box 1760
Long Beach, CA 90801
310-746-6337
Fax: 310-816-0412

Proton Corp.
16826 Edwards Road
Cerritos, CA 90703
310-404-2222
Fax: 310-404-2322

Radio Shack Business Products Division of Tandy Corp.
1801S. Beach Street
Fort Worth, TX 76105-2122
817-390-3011

Ricoh Corp.
3001 Orchard Pkwy.
San Jose, CA 95134
408-432-8800

Rotel of America
54 Concord Street
North Reading, MA 01864-2699
508-664-3820
Fax: 508-664-4109

Sampo Corporation of America
5550 Peachtree Industrial Blvd.
Norcross, GA 30071
404-449-6220
Fax: 404-447-1109

Samsung Electronics America, Inc.
Service Division
One Samsung Place
Ledgewood, NJ 07852
201-691-6200
Fax: 201-347-8650

Sansui Electronics Corp.
17509 South Margay Avenue
Carson, CA 90746
310-604-7300

Sanyo-Fisher (USA) Corp.
Consumer Electronics Sales Div.
21350 Lassen St.
Chatsworth, CA 91311
818-998-7322
For Service: SFS Corporation
1200 West Artesia Blvd.
Compton, CA 90220
310-537-5830
Fax: 310-605-6699

Scott, H.H. Inc.
5601 Westside Ave.
North Bergen, NJ 07047
201-662-2000
Parts/Technical Literature:
H.H. Scott, Inc.
State Route 41 & County Rd. 100W
Princeton, IN 47670
800-695-0095
Fax: 812-386-6502
Tech. Serv.: 800-922-0738

Sears
333 Beverly Road
Hoffman Estates, IL
708-286-5222

Sharp Electronics Corp.
Sharp Plaza
PO Box 650
Mahwah, NJ 07430-2135
201-512-0055
Fax: 201-512-3456

Sherwood/Inkel Corporation
14830 Alondra Blvd.
La Mirada, CA 90638-5730
714-521-6100

Shintom West Corp. of America
20435 S. Western Ave.
Torrance, CA 90501
310-328-7200

Shure Brothers, Inc.
222 Hartrey Avenue
Evanston, IL 60202-3696
Service: 708-866-5732
Customer Service: 708-866-2553
Fax: 708-866-2279

Signet
1920 Enterprise Parkway
Twinsburg, OH 44087
216-963-5959
Fax: 216-425-9339

Sony Corp. of America/ Sony Service Company
Sony Drive (T1-12)
Park Ridge, NJ 07656
201-930-1000

Sony National Parts Center
8281 N.W. 107th Terrace
PO Box 20407
Kansas City, MO 64153
816-891-7550

Soundcraftsmen, MTX
4545 E. Baseline Road
Phoenix, AZ 85044-5306
714-556-6191
Fax: 714-662-0750

SDI Technologies
(Formerly Soundesign Corporation)
800 Federal Blvd.
Carteret, NJ 07008
908-855-0220
Fax: 908-855-0224

Sparkomatic Corporation
P.O. Box 277
Milford, PA 18337
717-296-6444
800-233-8831 (Nationwide)
800-592-8891 (In PA)

Studer Revox America, Inc.
1865 Air Lane Drive #12
Nashville, TN 37210-3814
615-391-3399

Symphonic Corp.
(Also Funai)
100 North St.
Teterboro, NJ 07608
201-288-2606

Tandy Consumer Service Parts
7439 Airport Freeway
Ft. Worth, TX 76118
817-284-8691
800-243-1311
Fax: 817-284-1961

Tandy National Parts
900 East Northside Dr.
Ft. Worth, TX 76102
817-870-5600
800-442-2425

Tatung Company of America, Inc.
2850 El Presidio St.
Long Beach, CA 90810
310-637-2105
310-979-7055
Fax: 310-637-8484

TEAC Corporation of America
7733 Telegraph Rd.
Montebello, CA 90640
213-726-0303
Fax: 213-727-7656
Parts Orders: 213-726-0303
Fax for Parts Orders: 800-366-8868

Technics
See Matsushita

Teknika Electronics Corp.
A subsidiary of Fujitsu, Ltd.
Parts Department
353 Route 46 West
Fairfield, NJ 07004
201-575-0380
Fax: 201-575-7311

Teledyne
See Acoustic Research

Thomson Consumer Electronics
10330 N. Meridian Street
P.O. Box 1976
Indianapolis, IN 46290-1024
317-587-3000
Fax: 317-587-6759

Toshiba America Consumer Products Inc.
National Parts Center
1420 Toshiba Dr.
Lebanon, TN 37087
615-449-2360
Fax: 615-444-7520
800-345-9785

Tote Vision
969 Thomas St.
Seattle, WA 98109
206-623-6000
Fax: 206-623-6609
Parts Fax: 206-343-9029

Unisonic Products Corp.
1115 Broadway
New York, NY 10010
212-255-5400

Videonics
1370 Dell Ave.
Campbell, CA 95008
408-866-8300

(Continued on page 56)

Consumer Electronics Distributors

A.G. Tannenbaum
P.O Box 386
Ambler, PA 19002
215-540-8055
Fax: 215-540-8327

Accutest Instruments
PO Box 130
Clarksburg NJ 08510
800-524-0747

Alfa Electronics
P.O. Box 8089
Princeton, NJ 08543
609-520-2002
Fax: 609-520-2007

All Electronics Corp.
P.O. Box 567
Van Nuys CA 91408-0567
818-904-0524
800-826-5432

Allied Electronics, Inc.
An Avnet Co.
7410 Pebble
Fort Worth TX 76118
800-433-5700
Fax: 817-595-6470

Amcom Corporaton
6205 Bury Drive
Eden Prairie MN 55346
612-949-9400

American Design Componants
PO Box 2601
Secaucus, NJ 07096
201-601-8999
Fax: 201-941-7480

Andrews Electronics
PO Box 914
Valencia CA 91380-9014
805-257-7700
800-289-0300

Antique Automobile Radio
700 Tampa Road
Palm Harbor, FL 34683
813-785-8733
Fax: 813-789-0283

Antique Electronic Supply
6221 South Maple Avenue
Tempe, AZ 85283

Antique Radio Classified
P.O. Box 802-C12
Carlisle, MA 01741
508-371-0512
Fax: 508-371-7129

Aristo Computers, Inc.
6700 S.W. 105th Avenue
Suite 307
Beaverton, OR 97008-5484

Arrow Electronics Inc.
Catalog Sales Div.
1860 Smithtown Avenue
Ronkonkoma NY 11779
516-467-1000
800-932-7769

Atrix, Inc.
14301 Ewing Avenue South
Burnsville MN 55337
612-894-6154
800-222-6154

Audio Parts Co.
1070 South Orange Drive
Los Angeles CA 90019
213-933-2141

B-B&W Electronics
2137 S. Euclid Ave.
Berwin IL 60402
708-749-1710
800-722-9684

Vance Baldwin
2701 W. McNab
Pompano Beach, FL 33069
305-969-1811
800-432-8542

Blue Fin Technologies Inc.
208 Market Street
Portsmouth NH 03801
603-433-2223
Fax: 603-433-6437

Burks, P.I.
842 S. Seventh Ave.
Louisville KY 40203
502-589-3960
800-274-2875

Bursma Electronic Distributing
1030 Scribner N.W.
Grand Rapids MI 49504
616-459-4325
800-777-2604

C&S Sales
1245 Rosewood Drive
Deerfield IL 60015
708-541-3800
800-292-7711

Century Computer Marketing
4755 Alla Road
Marina Del Rey CA 90292
310-827-0999
Fax: 310-578-2592

Cititronix/PanSon
1641 Dielman Road
St. Louis MO 63132
314-427-3420
800-846-CITI

Classic Components Supply, Inc
3336 Commercial Ave.
Northbrook IL 60062-1975
708-272-9650

Com-Kyl, Inc.
1366 Borregas Ave.
Sunnyvale CA 94089
408-734-9660
800-538-1578

Computer Component Source
135 Eileen Way
Syosset NY 11791
516-496-8727
800-356-1227

Computer Parts Unlimited
5321 Derry Avenue, Suite-F
Agoura Hills CA 91301
818-879-1100

Computer Service Supply Corp.
136 Harvey Road
Londonberry, NH 03053
800-255-7815

Consolidated Electronics, Inc.
705 Watervliet Ave.
Dayton OH 45420-2599
513-252-5662
800-543-3568

Contact East
335 Willow Street South
North Andover MA 01845
508-682-2000
800-225-5334

Cooper Associates
112 Oakwood Road
McMurray PA 15317
412-941-6473
Fax: 412-941-3410

Curtis Mathes Parts & Service
10911 Petal Street
Dallas, TX 75238
800-657-1979
Fax: 214-503-8515

Custom Components Corporation
W224 S8445 Industrial Drive
Big Bend WI 53103
414-662-5266
Fax: 414-662-3781

Dak Tech
4900 Ritter Road
Mechanicsburg PA 17055
717-795-9544
Fax: 717-795-9420

Dak Tech
4025 9th Avenue SW
Fargo ND 58103
701-282-6686

Dalbani Corporation
4225 NW 72nd Avenue
Miami FL 33166
305-716-1016
800-325-2264

Dalco Electronics
275 Pioneer Blvd
Springboro OH 45066-1180
513-743-8042
800-445-5342

Digi-Key
701 Brooks Ave. S.
Thief River Falls MN 56701
218-681-6674
800-344-4539

Diversified Parts
2114 S.E. 9th Ave.
Portland OR 97214
503-236-6140
800-338-6342

E.I.L. Instruments
10946-A Golden West Drive
Hunt Valley MD 21031-1320
410-584-7400

E.M.T. Parts, Inc.
2031 East Via Burton St.
Anaheim CA 92806
714-758-8769
800-448-7892

EMCO Electronics
1172 Route 109
Lindenhurst NY 11757-0624
516-957-8700
800-645-5833

East Coast Transistor
2 Marlborough Road
West Hemstead NY 11552
516-483-5742
800-645-3516

Easy Tech
2917 Bayview Drive
Fremont CA 94538
415-770-2345
800-582-4044

Echelon Industries
20681 E. Truss Court
Walnut CA 91789
714-594-1891

Eiger Electronics
70-A E. Jefryn Blvd.
Deer Park NY 11729
516-242-2583
800-835-8316

Electro Dynamics, Inc. (EDI)
135 Eileen Way
Syosset NY 11791-9022
516-496-4400
800-356-1227

Electro Tool, Inc.
9103 Gilman
Livonia MI 48150
313-422-1221

Electronic Parts Supply
4071 Emery Street
Emeryville CA 94608
510-420-1040

Electronix Distribution Corp.
313 West Main Street
Fairborn OH 45324-5036
513-878-1828
800-223-3205

Electronix Express
365 Blair Road
Avenel NJ 07001
908-381-8020
800-972-2225

Elenco Electronics, Inc.
150 West Carpenter Avenue
Wheeling IL 60090
708-541-3800
Fax: 708-520-0085

E.M.T. Parts, Inc.
2031 East Via Burton Street
Suite J
Anaheim, CA 92806
714-758-8769
Fax: 714-758-8768

Excel Distributing
1819 Mentor Avenue
Cincinnati, OH 45212
513-531-3989
Fax: 513-531-4115

Win All This
A Great Chance To Try The New PRB Line SMT Accessories!

For a chance to win everything shown in the picture below, sign up through the 1995/1996 Schematic Profax Contest in this magazine.

Description	Part#
Quik Stick™ No Clean Solder	S600
Quik Clean™ Flux Remover	C80303
Chip Quik™ Alloy (16 ft.)	CQ180
Chip Quik™ No Clean Flux	CQ118
Quik Stick™ No Clean Rework Paste	S290
PRB Line Launch Kit (Plunger and tips for use with S290 & S291)	S299
Quik Wick™ .075" 5 ft.	S1000
Quik Wick™ .075" 10 ft.	S1001
Quik Wick™ .100" 5 ft.	S1002
Quik Wick™ .100" 10 ft.	S1003
PRB Line Pinpoint Applicator	Q001
PRB Line Pinpoint Syringe Assembly (3)	Q002
PRB Line Pinpoint Tips (1 of each):	Q0165, Q0185, Q0205, Q0225, Q0255, Q0275, Q0305

$250 Value

Product Highlights:

PRB Line
CHIPQUIK™
SMD Removal Kit

Removal process:
1) Apply Flux
2) Melt Chip Quik™ alloy on leads with a low temp. soldering iron
3) Remove SMD
4) Clean up PC board

Kit includes:
- Special Desolder/Alloy
- Special Flux
- Solder Removal Braid
- Complete Instructions

Part# CQ123
Introductory Price
$\$12.^{95*}$ +S & H

PRB Line
QuikStick™
No Clean Rework Paste

- Needs No Refrigeration
- One year shelf life
- No special shipping
- High quality 63-37 no clean RMA 200 solder paste with excellent wetting and solderability
- Undergoes stringent quality control and end product testing
- Meets federal specification QQ5571
- Convenient 12g or 24g 10cc syringe

Part# S290 (12g)
$\$6.^{59*}$ +S & H

Part# S291 (24g)
$\$12.^{75*}$ +S & H

Order from your nearest PRB Line Distributor or call...

PREMIUM PARTS+
ELECTRONICS COMPANY™

Phone: 800-558-9572
Fax: 800-887-2727
Quantity Discounts Available

Consumer Electronics Distributors

Fedco Electronics, Inc.
PO Box 1403
Fond Du Lac WI 54936
414-922-6490

Fox International
23600 Aurora Road
Bedford Heights OH 44146
216-439-8500
800-321-6993

R. Frazier, Inc.
1300 Intervale Drive
Salem VA 24153
703-387-3799
Fax: 703-387-1180

Galco Industrial Electronics
26010 Pinehurst Drive
Madison Heights MI 48071
810-542-9090
800-521-1615

GE Remarketing Services
2912 Pacific Dr
Norcross GA 30071
404-263-5984

GMB/dba Fox International
140 N. Belle Mead Road
Setauket NY 11733
800-874-1765

Global Micro-Parts Depot, Inc.
11151 Denton Drive
Dallas TX 75229
214-241-9470

HMC - Hub Material Co.
33 Springdale Avenue
Canton MA 02021
617-821-1870

Harco Electronics
Rte 22 Carsins Run
Aberdeen MD 21001
410-838-7990

Herman Electronics
7350 N.W. 35th Terrace
Miami FL 33122
305-477-0063
800-938-4376

Horizon Technology
650 International Parkway
Richardson TX 75081
800-888-9600

Hosfelt Electronics, Inc.
2700 Sunset Boulevard
Steubenville OH 43952-1158
614-264-6464
800-524-6464

Howard Electronics Insts Inc.
6222 North Oliver
Wichita KS 67220
316-744-1984
800-394-1984

Industrial Electronic Supplies
2101 N. Fairview St.
Santa Ana CA 92706
714-971-2292

Instek Corp.
1205 John Reed Court
City of Industry CA 91745
818-336-6537

International Components Corp.
107 Maxess Road
Melville NY 11747
516-293-1500
800-645-9154

JDR Micro
2233 Branham Lane
San Jose CA 95124
408-559-1200
800-538-5000

Jameco Electronics Components & Computer Products
1355 Shoreway Road
Belmont CA 94002
415-592-8097
800-831-4242

W.S. Jenks & Son
1933 Montana Avenue N.E.
Washington DC 20002
202-529-6020
Fax: 202-832-3411

Jensen Tools, Inc.
7815 South 46th Street
Phoenix AZ 85044-5399
602-968-6241
800-426-1194

Jim-Pak
1355 Shoreway Rd
Belmont CA 94002
415-595-5936

Joseph Electronics
8830 N. Milwaukee Avenue
Niles IL 60714
708-297-4200
800-323-5925

Kelvin Electronics
10 Hub Drive
Melville NY 11747
516-756-1750
800-535-8469

L.J. Enterprises
An Elec-Cetera Inc. Company
68 Railroad Avenue
Valley Stream NY 11580
516-872-5000

M.A.T. Electronics
400 Pike Road
Huntingdon Valley PA 19006
215-364-7667
800-628-1118

MAI/Prime Parts
5736 N. Michigan Rd.
Indianapolis IN 46208-1729
317-257-1590

MCM Electronics
650 Congress Park Drive
Dayton OH 45459-4072
513-434-0031
800-543-4330

Marshall Industries
9320 Telstar Ave.
El Monte CA 91731
818-307-6000

Metric Supply
21029 Itasca Street, Unit C
Chatsworth CA 91311-4924
818-701-7518

Micro Dimensions, Inc.
89K Washington Ave.
Natick MA 01760
508-650-9008

Micro Exchange
682 Passaic Avenue
Nutley NJ 07110
201-284-1200

Micro Mart, Inc.
159 State Road
Buzzard's Bay MA 02532
508-833-2225

Mill Electronics, Inc.
2026 McDonald Ave.
Brooklyn NY 11223
718-336-4575
800-346-8994

Montgomery Ward
National Parts Center
5750 McDermott Avenue
Berkeley IL 60163
800-323-1965

Mouser Electronics
2401 Highway 287 N.
Mansfield TX 76063
817-483-4422
800-346-6873

NEC Technologies, Inc.
1255 Michael Drive
Wood Dale IL 60191
708-860-9500
800-366-3632

NTE Electronics, Inc.
44 Farrand Street
Bloomfield NJ 07003
201-748-5089
800-631-1250

National Parts Depot
31 Elkay Drive
Chester NY 10918
914-469-4800

Neptune Electronics
PO Box 245495
Brooklyn NY 11224
800-242-5556

P.K. Neuses
1401 Rohlwing Rd.
Rolling Meadows IL 60008
708-253-6555

Omnitron Electronics
280 North Midland Avenue
Saddle Brook, NJ 07662
201-703-9800
Fax: 201-703-9804

PTS Corporation
5233 South Highway 37
Bloomington IN 47402
812-824-9331
800-844-7871

PanSon Electronics
180 & Maple Ave.
Pinebrook NJ 07058
800-846-2484

Parts Express International
340 East First Street
Dayton OH 45402
513-222-0173
800-338-0531

Parts Port
230 Bollingbrook St.
Petersburg VA 23803
800-253-0515

PC Service Source
1221 Champion Circle, Ste 105
Carrollton, TX 75006
214-406-8583
Fax: 214-406-9081

JC Penney
National Parts Center
6840 Barton Road
Morrow, GA 30260
404-961-8400

Peripheral Parts Support
219 Bear Hill Road
Waltham MA 02154
617-890-9191

Philips Consumer Electronics
Service Parts
907 Snapp Ferry Road
Greeneville TN 37744-0967
800-851-8885

Philips ECG
PO Box 967
Greeneville, TN 37744-0967
423-636-5893
Fax: 423-636-5809

Plaza Distributing
13268 66th Street N.
Largo FL 34643
813-531-5484
800-531-5484

Prelco Electronics
605 Chestnut Street
Union NJ 07083
908-851-8600
Fax: 908-686-4656

Premium Parts + Electronics Co
W9390 State Road 59
P.O. Box 28
Whitwater, WI 53190-0176
414-473-2151
Fax: 800-887-2727

Print Products International
8931 Brookville Rd.
Silver Spring MD 20910
301-587-7824
800-638-2020

Projector Recorder Belt
P.O. Box 176
Whitewater WI 53190-0176
414-473-2151
800-558-9572

RAG Electronics Inc.
Box 2450 Turquoise Circle
Newbury Park CA 91320
805-498-9933
800-732-3457

RNJ Electronics Inc.
805 Albany Ave.
Lindenhurst NY 11757
516-226-2700
800-645-5833

RS Electronics
34443 Schoolcraft
Livonia MI 48150
313-525-1155
800-366-7750

Richardson Electronics, Ltd.
40W267 Keslinger Road
LaFox IL 60147
708-208-2200
800-348-5580

Ruppman Parts Distribution
2130 Townline Road
Peoria IL 61615-1560
800-662-0504

Russell Industries
3000 Lawson Ave.
Oceanside NY 11572
516-536-5000
800-645-2202

SMH Electronics Co., Inc.
21 Pattersons Brook Road
West Wareham MA 02576
508-291-7447

SOS Computer Solutions
1634 Greenland Road
Greenland NH 03840
603-431-3777

SOS Parts
800-SOS-2554

SR Components, Inc.
52 Railroad Ave.
Valley Stream NY 11580
516-872-8100

Salen Enterprises
P.O. Box 915
Morton Grove, IL 60053
312-736-0999
Fax: 312-736-4238

Snap-On Incorporated
2801 80th Street
Kenosha, WI 53141-1410
414-656-5200
Fax: 414-656-5116

Sony Service Co.
National Parts Div.
8281 N.W. 107th Terrace
Kansas City MO 64153
816-891-7550
800-821-5662

South Street Service
516-922-0358

Specialized Products Co.
3131 Premier Drive
Irving TX 75063
214-550-1923
800-866-5353

Sprague Magnetics, Inc.
15720 Stagg St.
Van Nuys CA 91406
818-994-6602
800-553-8712

SR Components, Inc.
52 Railroad Avenue
Valley Stream NY 11580
516-872-8100
Fax: 516-872-8118

(Continued on page 56)

National Organizations

American Electronics Association (AEA)
1225 Eye St., N.W., Suite 950
Washington, DC 20005
202-687-9110

Association of Field Service Managers (AFSM)
1342 Colonial Blvd., Suite 25
Fort Meyers, FL 33907
813-275-7887

Career College Association (CCA)
750 1st St. NE
Suite 900
Washington, DC 20002
1-202-336-6700
1-202-336-6850

Custom Electronics Design & Installation Association
8335 Allison Pointe Trail
Indianapolis, IN 46250
800-CEDIA30

Electronic Industries Association/Consumer Electronics Group
2001 Pennsylvania Ave. N.W.
Washington, DC 20006-1813
202-457-8700
Fax: 202-457-4901
202-457-4985

Electronic Technicians Association (ETA)
602 North Jackson St.
Greencastle, IN 46135
Fax: 317-653-8262
800-886-8262

Federal Communications Commission
1919 M Street N.W.
Washington, DC 20463
FCC Public Access: 301-725-1072
(Computer bulletin board)
Manual Status Desk: 301-725-1585
(Open 2:00 PM to 4:30 PM Monday through Thursday)

Institute of Electrical and Electronic Engineers (IEEE)
345 East 47th St.
New York, NY 10017
212-705-7910

Musical Instrument Technicians Association, International
Ken Gerler, Secretary
8216 Audrain Dr.
St. Louis, MO 63121-4504
314-389-3290

National Electronic Distributors Association (NEDA)
35 East Wacker Dr., Suite 1100
Chicago, IL 60601
312-558-9114

National Association of Business and Educational Radio (NABER)
1501 Duke St., Suite 200
Alexandria, VA 22314
703-739-0300

National Association of Retail Dealers of America (NARDA)
National Association of Service Dealers (NASD)
10 East 22nd St.
Lombard, IL 60148
708-953-8950
Fax: 708-953-8957

National Electronic Servicing Dealers Association
International Society of Certified Electronics Technicians
(NESDA/ISCET)
2708 W. Berry St.
Ft. Worth, TX 76109
817-921-9062

Professional Service Association
71 Columbia St.
Cohoes, NY 12047
518-237-2953

Satellite Dealers Coalition
PO Box 1009
Ballwin, MO 63022
314-394-1145
800-767-7827

Semiconductor Equipment & Materials International (SEMI)
805 East Middlefield Rd.
Mountain View, CA 94043
415-964-5111

Service Contract Industry Council
204-B S. Montrose St.
Tallahassee, FL 32302-2068
904-681-1058

United Servicers Association, Inc. (USA)
PO Box 626
Westmont, IL 60559
5630 Harmarc Pl.
Downers Grove, IL 60516
708-968-6752
800-432-0972

Vocational Industrial Clubs of America
PO Box 3000
Leesburg, VA 22075
703-777-8810

To Order Back Issues

Send $3.50 Per Issue
(Check, Money Order, Mastercard, VISA, Discover and AMEX).

Send All Correspondence To:

CQ Communications
76 North Broadway
Hicksville, NY 11801
Or Call 516-681-2922
FAX 516-681-2926

Order Your Back Issues Today!

MONITOR REPAIR SOFTWARE

Resolve Monitor Repair Database
Shareware Version 1.8 **$29**
Version 3.14 **$249**
2,228 repairs/ 362 models, Manufacturer's Cross, Reference, FCC ID, Component Sources

Video Test Bench
Monitor Test Pattern Software **$129**
67 Patterns and Loops
CGA, EGA, VGA, SVGA

CALL TOLL FREE 1-800-999-0304

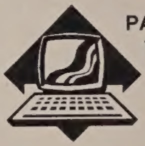
ANATEK CORPORATION
P.O. BOX 1200
AMERST, NH 03031
http://www.anatekcorp. com/repair.htm

THE LARGEST TECH-TIP PROGRAM AVAILABLE
24,000 TECH-TIPS
TEST OUR FULL COMPUTER PROGRAM "FREE"

TV-MAN TECH-TIPS LEAD WITH SPEED

WE PAY THE POSTAGE ROUND TRIP - NO RISK

"OUR TRUST IS IN YOUR SATISFACTION".
(Proven to pay for itself within a few repairs)



PAPER OR COMPUTER
TV-MAN TECH-TIPS
" PAY "

ONE-TIME MEMBERSHIP FEE WITH OPTIONAL UPDATES

AVAILABLE IN DOS, TRUE WINDOWS OR PAPER MANUAL FORMATS

165 BRANDS IN ONE CONVENIENT PROGRAM

SAVE TIME DIAGNOSING, ORDERING SERVICE MANUALS AND RESEARCHING PART NUMBERS
(((YOU MAY NOT NEED!)))

GET TO THE BOTTOM LINE
" PROFITABLY "
CALL (800) 474-3588
or
ED ERICKSON at 407-750-9922

Consumer Electronics State Associations

A

Alabama
(None Available)

Arizona
Arizona State Electronics Association (ASEA)
PO Box 9657
Phoenix, AZ 85068
602-942-0040

Arkansas
Television Service Association of Arkansas, Inc. (TSA-AR)
5522 W. 12th
Little Rock, AR 72204
501-663-7564

C

California
California State Electronics Association (CSEA)
10564 Progress Way, Unit F
Cypress, CA 90630
714-827-4986
Fax: 714-827-5630

Colorado
(None Available)

Connecticut
The Electronics Service Association of Connecticut, Inc. (TELSA)
1935 State Street
Hamden, CT 06517
203-776-9123

D

District of Columbia
(None Available)

F

Florida
Florida Electronic Sales & Service Association (FESA)
1409 Glendale Road
Jacksonville, FL 32216
904-725-9789

Professional Electronics Association of Florida (PEAF)
8614 State Road
Ft. Lauderdale, FL 33324
305-474-2577

G

Georgia
Georgia Electronic Service Dealers Association (GESDA)
987 Sycamore Dr.
Decatur, GA 30030
912-788-5281

I

Idaho
Idaho Professional Electronics Association (IPEA)

Illinois
Electronic Service Dealers Association of Illinois (ESDA-IL)
4927 W. Irving Park Road
Chicago, Il 60641
312-282-9400

Indiana
Indiana Electronic Service Assoc.
307 W. Wolf
Elkhart, IN 46516
219-293-9664

Iowa
Television Service Association of Iowa (TSA-IA)

K

Kansas
Kansas Electronic Association (KEA)
1509 N. Lorraine
Hutchinson, KS 67501
316-662-1973

Kentucky
Kentucky Electronic Services Association (KESA)

L

Louisiana
Electronics Technicians Association of Greater New Orleans, Inc. (ETA-GNO)

M

Maine
(None Available)

Maryland
Chesapeake Electronics Association
1306 Continental Drive, Suite 301
Abingdon, MD 21009
301-676-7300
410-676-7300
Fax: 800-888-3293

Massachusetts
Electronic Technicians Guild of Massachusetts, Inc. (ETG-MA)
159 Massachusetts Ave.
Arlington, MA 02174
617-648-2431

Michigan
Electronics Service Dealers Association of Michigan, Inc.
8840 W. Warren Ave.
Dearborn, MI 48126
313-834-7010

Minnesota
(None Available)

Mississippi
(None Available)

Missouri
Missouri Electronics Service Dealers Association (MESDA)
1411 S. Big Bend Blvd.
St. Louis, MO 63117
314-645-5250

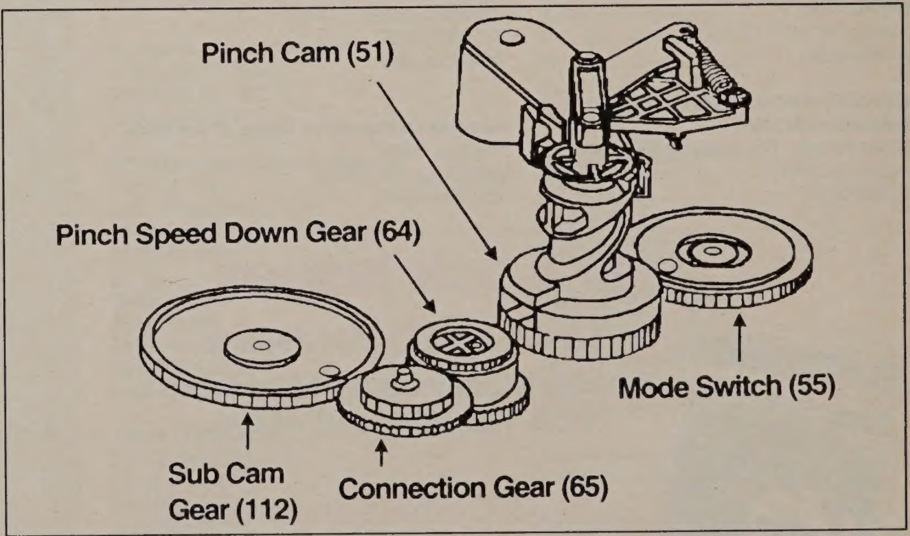
THE FIRST UNWRITTEN LAW OF VCR REPAIR

GEAR ADJUSTMENTS ARE THE LEADING CAUSE OF INSANITY AND RAGE AMONG VCR SERVICE TECHNICIANS.

To help in finding the cure, call:

1-800-428-7267

The technicians at Howard Sams had your well-being in mind when they re-engineered *VCRfacts®* to include mechanical alignment information with exact placement of gears and gear assemblies. See how simple it can be!



In anticipation of other common problems, *VCRfacts®* also features consistent standard-notation schematics, electronic parts lists, IC functions, interconnect wiring diagrams, and extensive exploded views. Now for your own peace of mind, call us and order your subscription today.

HOWARD W. SAMS & COMPANY
2647 Waterfront Parkway E. Dr., Indianapolis, IN 46214

N

Nebraska
Nebraska Electronic Service Association
111 E. Broadway
PO Box 41
Seward, NE 68434
402-283-4333

Nevada
(None Available)

New Hampshire
(None Available)

New Jersey
(None Available)

New York
NESDA New York State
592 Stewart Avenue
Bethpage, NY 11714
516-931-7616

North Carolina
North Carolina Electronics Association
(NCEA)
608 E. Franklin Blvd.
Gastonia, NC 28054
704-866-8787

O

Ohio
NESDA of Ohio
2980 Erich Dr.
Willoughby Hills, OH 44092
216-585-4335

Oklahoma
(None Available)

Oregon
Oregon Professional Electronics
Association (OPEA)
4505 S.E. Belmont
Portland, OR 97215
503-234-8065

P

Pennsylvania
(None Available)

R

Rhode Island
Electronic Technicians Guild of Rhode
Island (ETG-RI)
29 Dean St.
Pawtucket, RI 02861
401-725-8719

S

South Carolina
(None Available)

T

Tennessee
Tennessee Electronic Service Dealers
Association (TESDA)
PO Box 545
Soddy-Daisy, TN 37379
615-332-4873
Fax: 615-332-7805

Texas
Texas Electronics Association (T-E-A)
2708 W. Berry St., Ste. 7
Ft. Worth, TX 76109-2396
817-926-9204

U

Utah
Musical Instrument Technicians
Association, Int'l
Holly Clouse, office manager, membership
3637 East 7800 South
Salt Lake City, UT 84121
801-942-7870

V

Vermont
Vermont Electronic Technicians
Association (VETA)

Virginia
Virginia Electronics Association (VEA)
329 Virginia Beach Blvd.
Virginia Beach, VA 23451
804-428-7317

W

Washington
6319 112th Street East
Puyallup, WA 98373
206-851-6428

West Virginia
(None Available)

Wisconsin
Wisconsin Electronic Sales & Service
Association (WESA)
PO Box 09091
Milwaukee, WI 5320

17,250 Service Tips $149.95

In a simple and easy to use format. All information is in alphabetical order by Brand Model/ Chassis & Symptom with Part Numbers Values & Locations & Concise Solutions on Color & Projection TV's, VCR's, Camcorders, Computer Monitors & most other consumer electronic equipment.

THE MOST CURRENT TECHNICAL TIPS COMPUTER PROGRAM AVAILABLE TODAY.

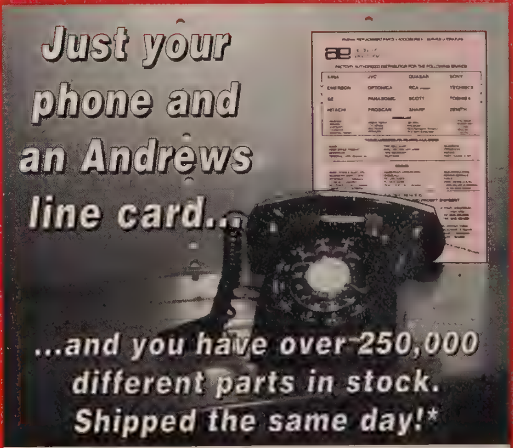
SERVICE TIPS installs in minutes & can be operated by anyone. Created by electronic technicians, it is an indispensable tool for your service center. By purchasing SERVICE TIPS YOU WILL INCREASE YOUR PROFITS by reducing your troubleshooting time, increasing your productivity and lowering your parts expenses.

FOR MORE INFORMATION ABOUT SERVICE TIPS OR ON OUR OTHER PRODUCTS

CALL 1-800-621-8477

ELECTRONIC SOFTWARE DEVELOPERS INC.
826 South Main Street
South Farmingdale, NY 11735

Phone 800-289-0300 FAX 800-289-0301


Just your phone and an Andrews line card...
...and you have over 250,000 different parts in stock. Shipped the same day!*

AIWA SONY EMERSON
HITACHI JVC PANASONIC RCA*
OPTONICA SCOTT PROSCAN*
QUASAR TECHNICS GE*
SHARP ZENITH TOSHIBA
(*Premier)

- Over a 90% Fill Rate
- No minimum orders
- Backorder reports with ETA's mailed biweekly
- No handling charges
- Free or Discounted freight program
- Fast, Efficient Research
- Factory Authorized

*Applies to orders received by 2:30 PST

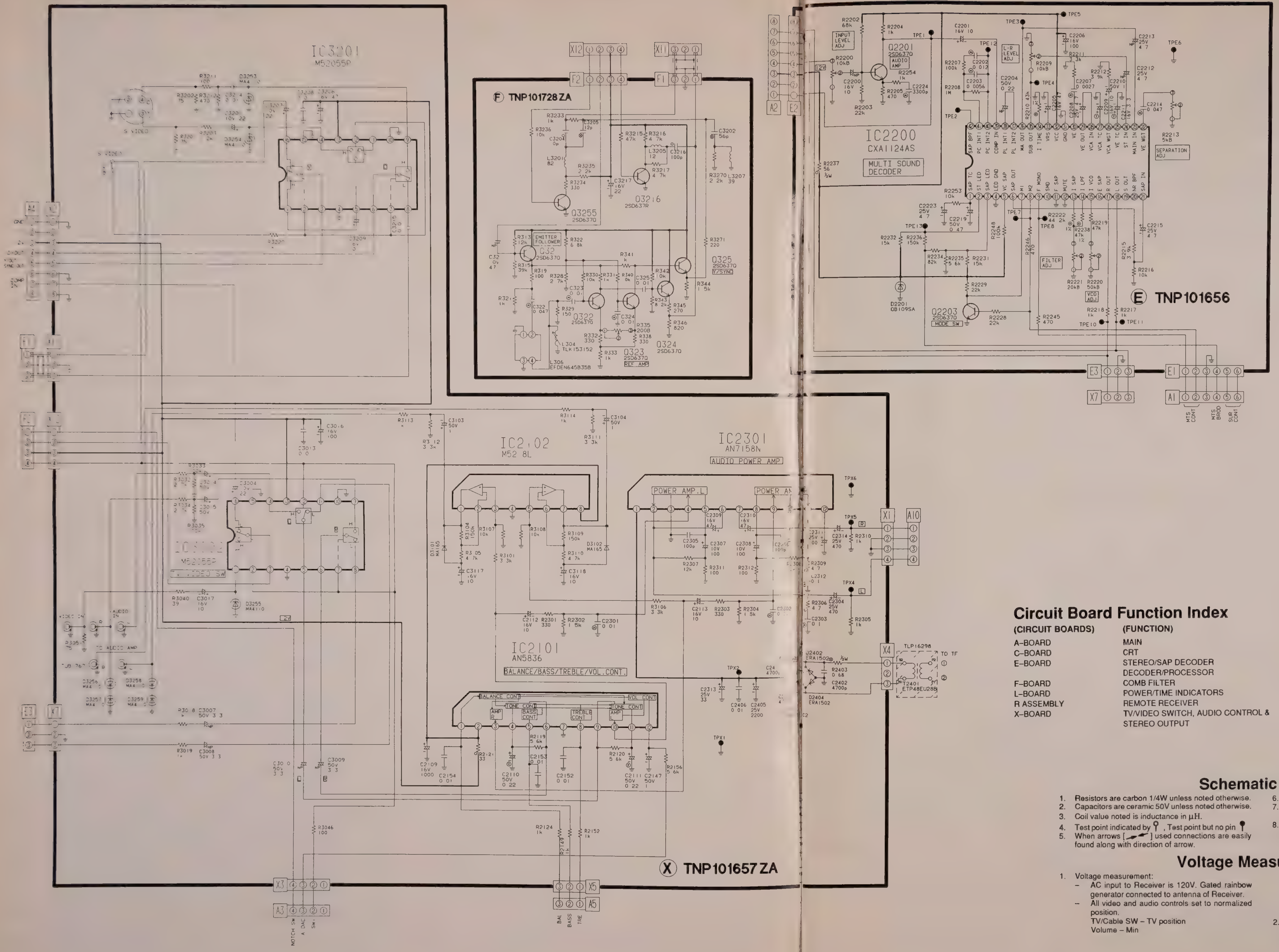
andrews electronics
P.O. Box 914
Santa Clarita, CA 91380-9014
Inquiries: 805-257-7700
FAX 805-295-5162

Stocking the Largest Inventory of O.E.M. Parts, Accessories, and Service Literature in the Country

Panasonic

Panasonic TV Model CTM-2092S Chassis ALEDP203

EF&X



Voltage Chart – E–Board

Integrated Circuits (ICs)

IC2200			
1.	4.9	22	4.5
2	0	23	4.5
3	2.4	24	4.5
4	0	25	2.0
5	6.0	26	4.4
6	4.5	27	2.0
7	2.2	28	4.5
8	0	29	4.4
9	0	30	4.6
10	2.2	31	0
11	0	32	9.0
12	0	33	4.5
13	1.2	34	1.2
14	1.2	35	4.5
15	1.2	36	4.3
16	4.5	37	7.7
17	4.5	38	4.5
18	4.5	39	4.5
19	4.5	40	4.5
20	4.5	41	4.5
21	4.5	42	4.4

Transistors

Ref.	b	c	e
Q2201	1.9	6.2	1.3
Q2203	0	2.1	0

Voltage Chart – F–Board

Transistors

Ref.	b	c	e
Q321	8.8	11.9	8.1
Q322	3.3	7.0	2.6
Q323	3.3	6.9	2.6
Q324	5.2	11.9	4.6
Q325	6.9	11.9	6.2
Q3216	0.3	11.9	0
Q3255	0	11.9	0

Voltage Chart – X–Board

Integrated Circuits (ICs)

IC2101		IC2102		IC2301		IC3002		IC3201	
1	5.3	1	7.5	1	18.8	1	5.8	1	5.8
2	10.8	2	7.5	2	9.5	2	0.3	2	0
3	7.5	3	7.5	3	0	3	4.4	3	4.3
4	3.6	4	0	4	0	4	0	4	0
5	5.2	5	7.4	5	1.1	5	4.4	5	4.4
6	3.6	6	7.5	6	17.8	6	4.4	6	4.4
7	0	7	7.5	7	17.9	7	0.3	7	0
8	5.1	8	10.8	8	1.1	8	5.8	8	5.8
9	3.6			9	0	9	5.8	9	5.8
10	7.5			10	0	10	0	10	0
11	3.6			11	9.5	11	5.8	11	5.8
12	0.1			12	18.8	12	0.3	12	0
						13	11.9	13	11.9
						14	5.8	14	5.8
						15	0	15	0
						16	5.8	16	5.8

Circuit Board Function Index

(CIRCUIT BOARDS)	(FUNCTION)
A–BOARD	MAIN
C–BOARD	CRT
E–BOARD	STEREO/SAP DECODER DECODER/PROCESSOR
F–BOARD	COMB FILTER
L–BOARD	POWER/TIME INDICATORS
R ASSEMBLY	REMOTE RECEIVER
X–BOARD	TV/VIDEO SWITCH, AUDIO CONTROL & STEREO OUTPUT

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in µH.
4. Test point indicated by ○ , Test point but no pin ●
5. When arrows [→ ←] used connections are easily found along with direction of arrow.
6. — **(BOLD LINES)** Indicates the route of B+ supply.
7. This schematic diagram is the latest at the time of printing and subject to change without notice.
8. Ground symbol ⫽ indicates **HOT GROUND CONNECTION** and ⏚ indicates COLD GROUND CONNECTION.

Voltage Measurements

1. Voltage measurement:
   - AC input to Receiver is 120V. Gated rainbow generator connected to antenna of Receiver.
   - All video and audio controls set to normalized position.
     TV/Cable SW – TV position
     Volume – Min
   - Voltage readings are nominal and vary ±10% on active devices.
     Some voltage readings will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⫽ or ⏚ indicates ground lead connection of meter. **Caution: Incorrect ground connection will result in erroneous readings.**

Tuner Voltage Chart

U/V tuner voltage test points are located and designated on the circuit side of A–Board.
BP 5V BM 12V AGC 7.5V

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.
NOTE: Voltage at the 30V test pin varies with channel selection. Please refer to correct chart depending on TV/CATV(CABLE) switch position.

TV Position

	CH	VOLT	CH	VOLT	CH	VOLT
VHF	2	3.7	25	10.7	48	16.4
	3	4.6	26	11.0	49	16.7
	4	5.7	27	11.3	50	16.9
	5	7.8	28	11.5	51	17.2
	6	9.0	29	11.8	52	17.5
	7	7.3	30	12.0	53	17.8
	8	7.8	31	12.3	54	18.1
	9	8.3	32	12.5	55	18.4
	10	8.8	33	12.8	56	18.7
	11	9.4	34	13.0	57	19.1
	12	9.9	35	13.3	58	19.4
	13	10.4	36	13.5	59	19.8
UHF	14	7.7	37	13.7	60	20.2
	15	8.0	38	14.0	61	20.6
	16	8.3	39	14.2	62	21.0
	17	8.6	40	14.5	63	21.5
	18	8.8	41	14.7	64	21.9
	19	9.1	42	14.9	65	22.4
	20	9.4	43	15.2	66	22.9
	21	9.7	44	15.4	67	23.5
	22	9.9	45	15.7	68	24.1
	23	10.2	46	15.9	69	24.7
	24	10.5	47	16.2		

Cable Position

	CH	VOLT	CH	VOLT	CH	VOLT	CH	VOLT
CABLE	01	6.7	26	12.2	51	4.2	76	10.6
	02	3.8	27	12.7	52	4.4	77	10.9
	03	4.7	28	13.1	53	4.7	78	11.2
	04	5.7	29	13.5	54	4.9	79	11.4
	05	7.8	30	14.0	55	5.1	80	11.7
	06	9.1	31	14.5	56	5.3	81	11.8
	07	7.3	32	14.9	57	5.6	82	12.2
	08	7.9	33	15.5	58	5.8	83	12.4
	09	8.4	34	16.0	59	6.1	84	12.7
	10	9.0	35	16.5	60	6.3	85	12.9
	11	9.5	36	17.1	61	6.6	86	13.2
	12	10.0	37	17.7	62	6.8	87	13.4
	13	10.4	38	18.3	63	7.1	88	13.7
	14	18.2	39	19.1	64	7.4	89	13.9
	15	22.0	40	19.8	65	7.6	90	14.1
	16	3.9	41	20.6	66	7.9	91	14.4
	17	4.3	42	21.5	67	8.2	92	14.6
	18	4.7	43	22.5	68	8.5	93	14.9
	19	5.2	44	23.7	69	8.7	94	15.1
	20	5.6	45	24.9	70	9.0	95	10.2
	21	6.3	46	26.3	71	9.3	96	12.0
	22	6.8	47	3.5	72	9.5	97	13.4
	23	10.9	48	3.7	73	9.8	98	14.8
	24	11.3	49	3.9	74	10.1	99	16.5
	25	11.8	50	4.1	75	10.4		

The AUDIO MODES being broadcast are displayed on screen in red by the voltage change to DAC input (Pin 20) of MPU IC001. Pin 20 is normally 4.0V~5.0V

AUDIO MODE BROADCAST	PIN 20
MONO	4.0V~5.0V
SAP	2.3V~4.0V
STEREO	1.0V~2.0V
STEREO & SAP	0V~0.9V

The Functions listed below are activated by a DC voltage change to DAC Inputs (Pin 18 and 19) of MPU IC001. Pins 18 and 19 are normally 4.6V~5.0V. Press and hold function button on Receiver to take voltage readings.

FUNCTION	PIN 18	PIN 19
POWER	0V~0.6V	4.6V~5.0V
VOL ▼	0.7V~1.2V	4.6V~5.0V
VOL ▲	1.3V~1.8V	4.6V~5.0V
CH ▼	1.9V~2.4V	4.6V~5.0V
CH ▲	2.6V~3.0V	4.6V~5.0V
NORMALIZE	3.2V~3.7V	4.6V~5.0V
DISPLAY	4.6V~5.0V	0V~0.6V
SET–UP	4.6V~5.0V	0.7V~1.2V
VIDEO	4.6V~5.0V	1.3V~1.8V
TV/VIDEO	4.6V~5.0V	1.9V~2.4V
NOISE REDUCTION	4.6V~5.0V	3.2V~3.7V
CATV	4.6V~5.0V	3.8V~4.3V

Voltage Chart – A–Board

Integrated Circuits (ICs)

IC001			
1	5.1	27	5.1
2	0	28	5.1
3	4.3	29	0.1
4	11.9	30	5.1
5	0	31	0.1
6	4.9	32	4.2
7	5.0	33	0.3
8	0	34	0.1
9	0	35	0.3
10	0	36	4.9
11	5.1	37	2.4
12	0.3	38	2.5
13	5.2	39	4.8
14	5.2	40	2.5
15	5.2	41	2.6
16	0.2	42	5.1
17	5.1	43	5.1
18	5.1	44	2.2
19	5.1	45	2.3
20	1.5	46	0
21	2.6	47	0
22	4.6	48	0
23	0.5	49	5.1
24	0.2	50	5.1
25	5.1	51	0
26	5.1	52	0

IC101			
1	0	27	2.4
2	7.9	28	2.0
3	0	29	3.0
4	0.7	30	3.0
5	0	31	2.8
6	2.1	32	2.8
7	4.2	33	2.4
8	2.4	34	5.0
9	6.1	35	2.9
10	0.7	36	2.9
11	2.7	37	0
12	8.1	38	7.3
13	2.4	39	3.5
14	5.8	40	4.4
15	7.6	41	3.4
16	6.5	42	3.0
17	1.5	43	9.1
18	1.5	44	5.6
19	5.0	45	5.6
20	2.2	46	5.6
21	3.7	47	0
22	2.6	48	4.4
23	2.6	49	7.3
24	5.4	50	7.3
25	3.3	51	7.3
26	0.5	52	3.3

IC451	
1	12.8
2	7.9
3	6.5
4	0
5	6.5
6	6.2
7	26.2
8	2.1
9	1.3
10	0
11	15.8
12	27.1
13	5.4

IC551	
1	16.5
2	0
3	11.9

IC801 ⏚	
1	0.2
2	131.6
3	153.4
4	130.6
5	NC

Transistors

Ref.	b	c	e
Q001	0	0.2	0
Q002	6.1	0	5.1
Q004	5.7	11.3	5.1
Q005	4.9	5.7	5.7
Q006	0.2	11.9	0
Q007	0.7	0.1	0
Q019	8.5	9.1	7.9
Q102	8.7	0	9.3
Q301	3.1	11.9	2.4
Q303	4.1	0	4.8
Q304	4.4	11.9	3.7
Q316	0.7	0	0
Q451	0.6	0.1	0
Q454	11.9	0.1	11.9
Q501 ⏚	0	95.4	0
Q531	7.3	11.9	7.6
Q532	11.9	0	11.9
Q533	0	4.1	0
Q541	0.2	4.2	0
Q551 ⏚	0	135.4	0
Q601	1.9	1.3	1.3
Q602	1.4	9.1	0.7
Q603	1.3	9.1	0.6
Q604	2.0	1.3	1.3
Q3102	3.5	8.8	2.9
Q3103	8.8	11.9	8.2
Q3104	9.5	3.5	10.2
Q3105	0.3	2.7	0

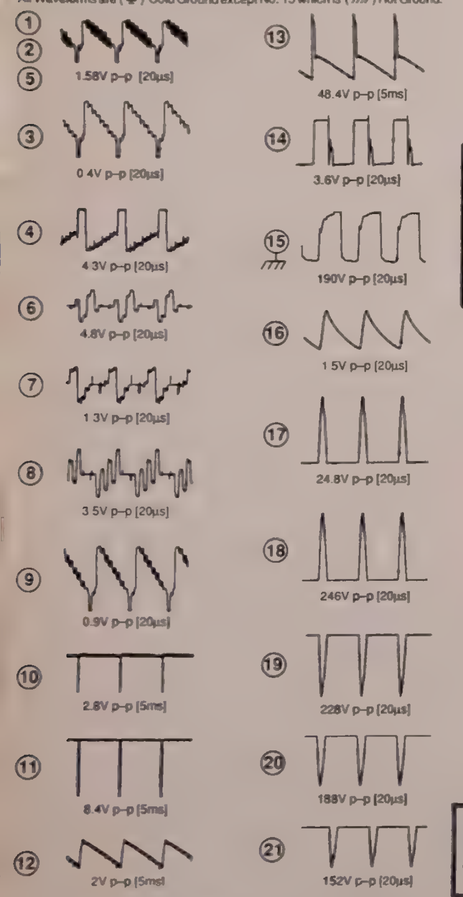
Voltage CHART – C–Board

Transistors

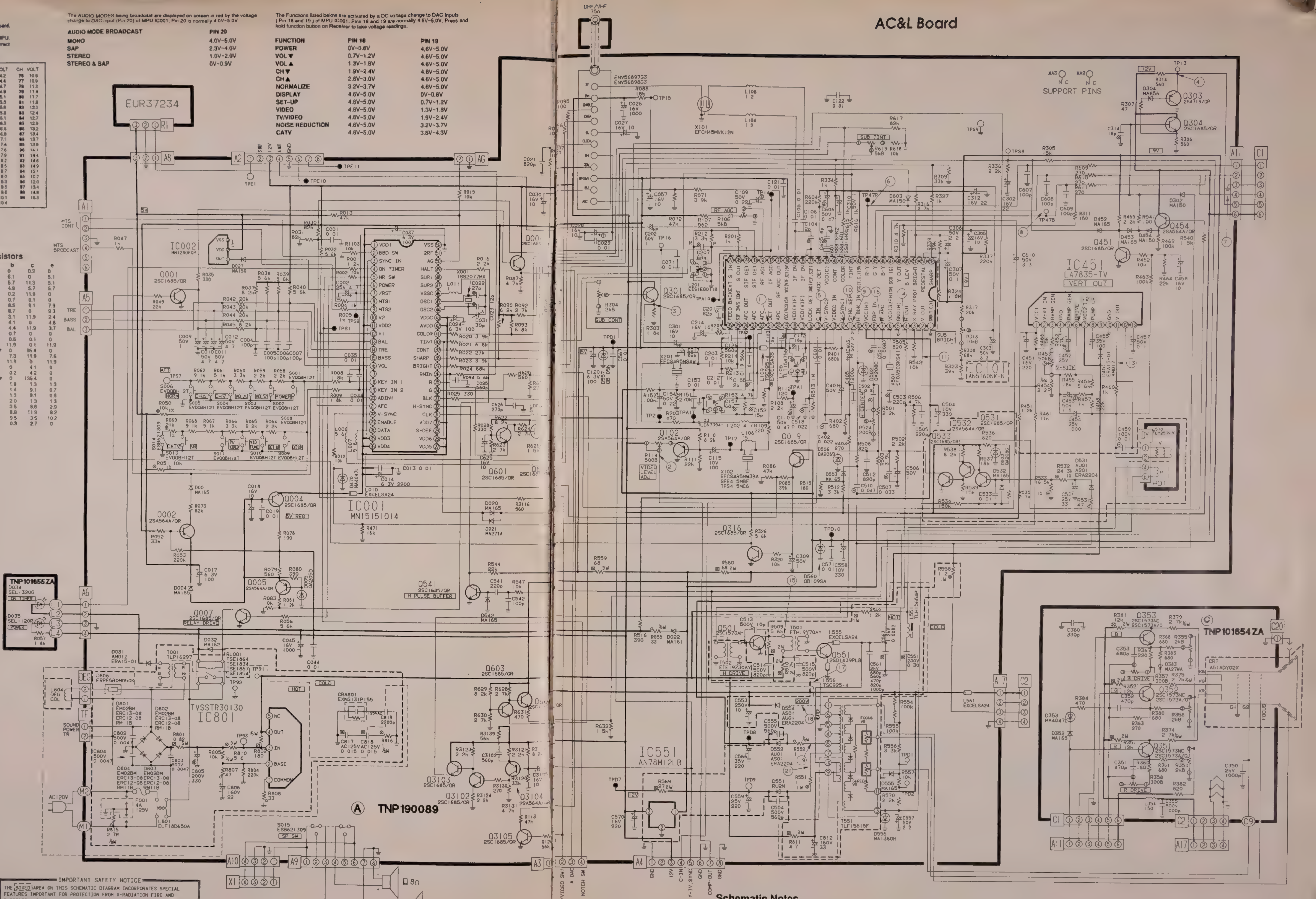
Ref.	b	c	e
Q351	5.8	154.0	5.2
Q352	5.8	156.8	5.3
Q353	5.8	180.8	5.2

Waveforms – A Schematic

All Waveforms are (⏚) Cold Ground except No. 15 which is (⏚) Hot Ground.



AC&L Board



IMPORTANT SAFETY NOTICE

THE BOXED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION FIRE AND ELECTRICAL SHOCK HAZARDS WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE BOXED AREAS OF THE SCHEMATIC

Waveform Measurements

1. Taken with a standard gated rainbow generator connected to antenna terminal.
2. Secondary Operating Controls (Video/Audio Menu) are set to Normalize. Volume "MIN".
3. All video and color waveforms taken with a wideband scope and a probe with low capacity (10 to 1). Shape and peak amplitudes may vary depending on type of Oscilloscope used and calibration.
4. Ground symbol ⏚ (HOT) or ⏚ (COLD) indicates ground lead connection of Oscilloscope.

CAUTION: Incorrect ground connection of test equipment will result in erroneous readings.

These waveforms have been taken in the order of circuit flow through the various sections as follows:

VIDEO – Waveforms 1~4
COLOR – Waveforms 5~8
VERTICAL – Waveforms 9~13
HORIZONTAL – Waveforms 14~16
POWER SUPPLY – 17~21

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in µH.
4. Test point indicated by ♀ , Test point but no pin ♀
5. When arrows [→] used connections are easily found along with direction of arrow.
6. — (BOLD LINES) Indicates the route of B+ supply.
7. This schematic diagram is the latest at the time of printing and subject to change without notice
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION** and ⏚ indicates COLD GROUND CONNECTION.

Voltage Measurements

1. Voltage measurement:
   - AC input to Receiver is 120V. Gated rainbow generator connected to antenna of Receiver.
   - All video and audio controls set to normalized position.
     TV/Cable SW – TV position
     NR Button – Noise Reduction Off
     Volume – Min
     TV/Video – TV
   - Voltage readings are nominal and vary ±10% on active devices.
     Some voltage readings will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⏚ or ⏚ indicates ground lead connection of meter. **Caution: Incorrect ground connection will result in erroneous readings.**

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

54MHz ↔ 130MHz ↔ 360MHz ↔ 806MHz

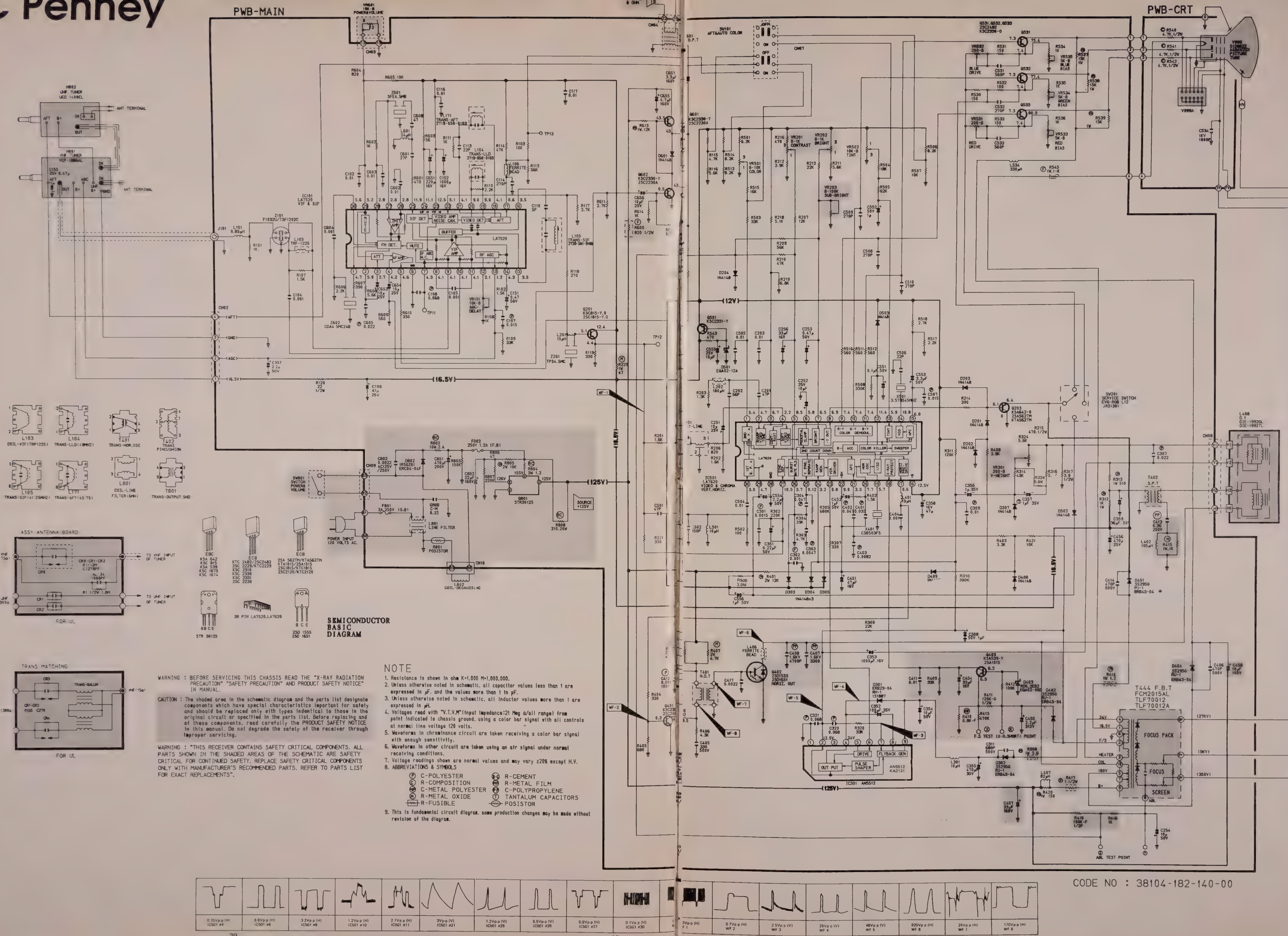
	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02~06	07~13	
UHF			14~69
CABLE	01~06,14,15,95~99	07~13,16~46	47~94

NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

Circuit Board Function Index

(CIRCUIT BOARDS)	(FUNCTION)
A–BOARD	MAIN
C–BOARD	CRT
E–BOARD	STEREO/SAP DECODER DECODER/PROCESSOR
F–BOARD	COMB FILTER
L–BOARD	POWER/TIME INDICATORS
R ASSEMBLY	REMOTE RECEIVER
X–BOARD	TV/VIDEO SWITCH, AUDIO CONTROL & STEREO OUTPUT

JC Penney TV Model 2157



WARNING : BEFORE SERVICING THIS CHASSIS READ THE "X-RAY RADIATION PRECAUTION" "SAFETY PRECAUTION" AND PRODUCT SAFETY NOTICE" IN MANUAL.

CAUTION : The shaded area in the schematic diagram and the parts list designate components which have special characteristics important for safety and should be replaced only with types indentical to those in the original circuit or specified in the parts list. Before replacing and of these components, read carefully the PRODUCT SAFETY NOTICE in this manual. Do not degrade the safety of the receiver through improper servicing.

WARNING : "THIS RECEIVER CONTAINS SAFETY CRITICAL COMPONENTS. ALL PARTS SHOWN IN THE SHADED AREAS OF THE SCHEMATIC ARE SAFETY CRITICAL FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS. REFER TO PARTS LIST FOR EXACT REPLACEMENTS".

NOTE

1. Resistance is shown in ohm K=1,000 M=1,000,000.
2. Unless otherwise noted in schematic, all capacitor values less than 1 are expressed in μF. and the values more than 1 in pF.
3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μH.
4. Voltages read with "V.T.V.M"(Input impedance:21 Meg Ω/all range) from point indicated to chassis ground, using a color bar signal with all controls at normal line voltage 120 volts.
5. Waveforms in chrominance circuit are taken receiving a color bar signal with enough sensitivity.
6. Waveforms in other circuit are taken using an air signal under normal receiving conditions.
7. Voltage readings shown are normal values and may vary ±20% except H.V.
8. ABBREVIATIONS & SYMBOLS

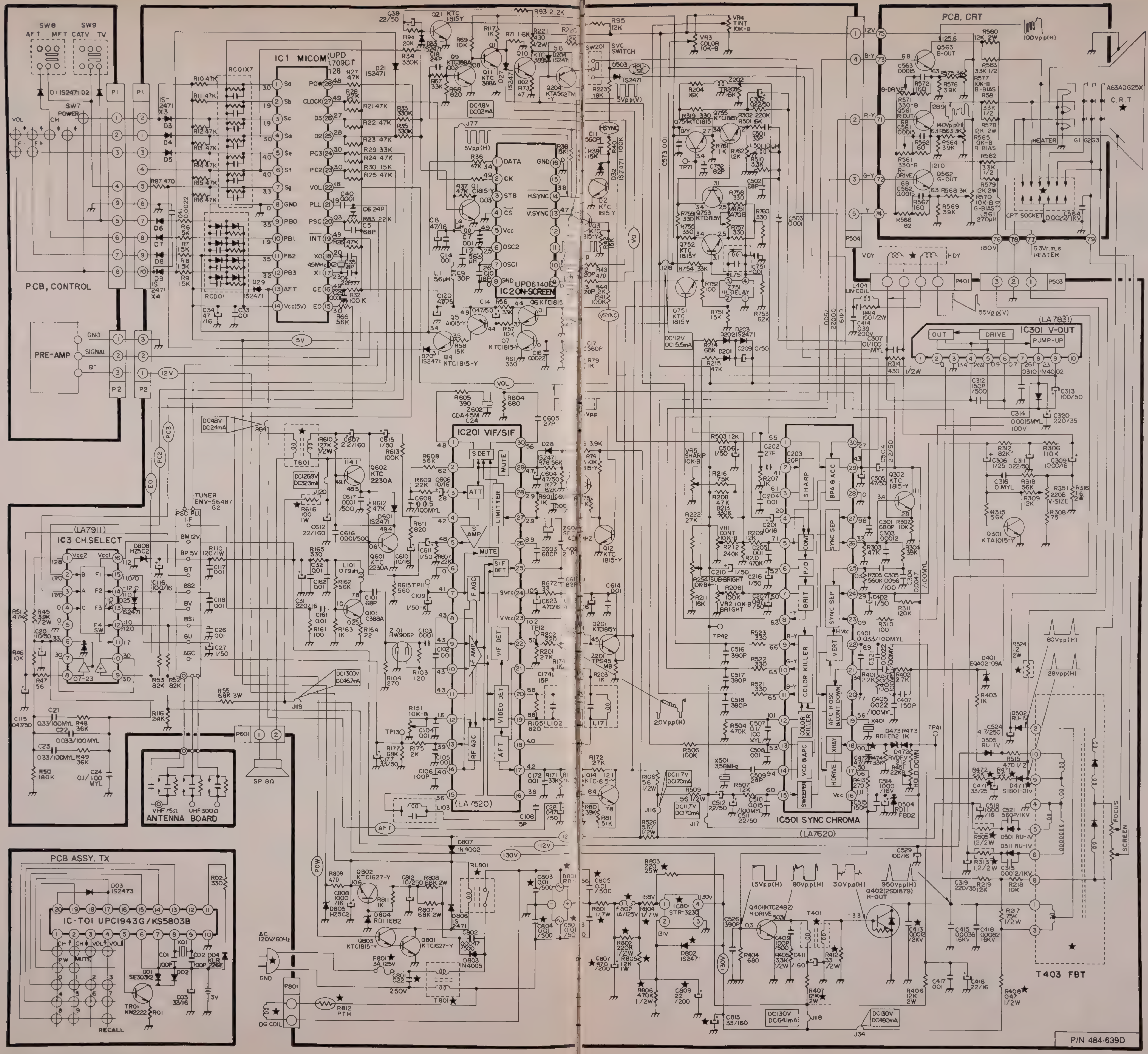
Ⓟ	C-POLYESTER	R-C	R-CEMENT
Ⓒ	R-COMPOSITION	MF	R-METAL FILM
MP	C-METAL POLYESTER	PP	C-POLYPROPYLENE
Ⓜ	R-METAL OXIDE	Ⓣ	TANTALUM CAPACITORS
	R-FUSIBLE		POSISTOR

9. This is fundamental circuit diagram, some production changes may be made without revision of the diagram.

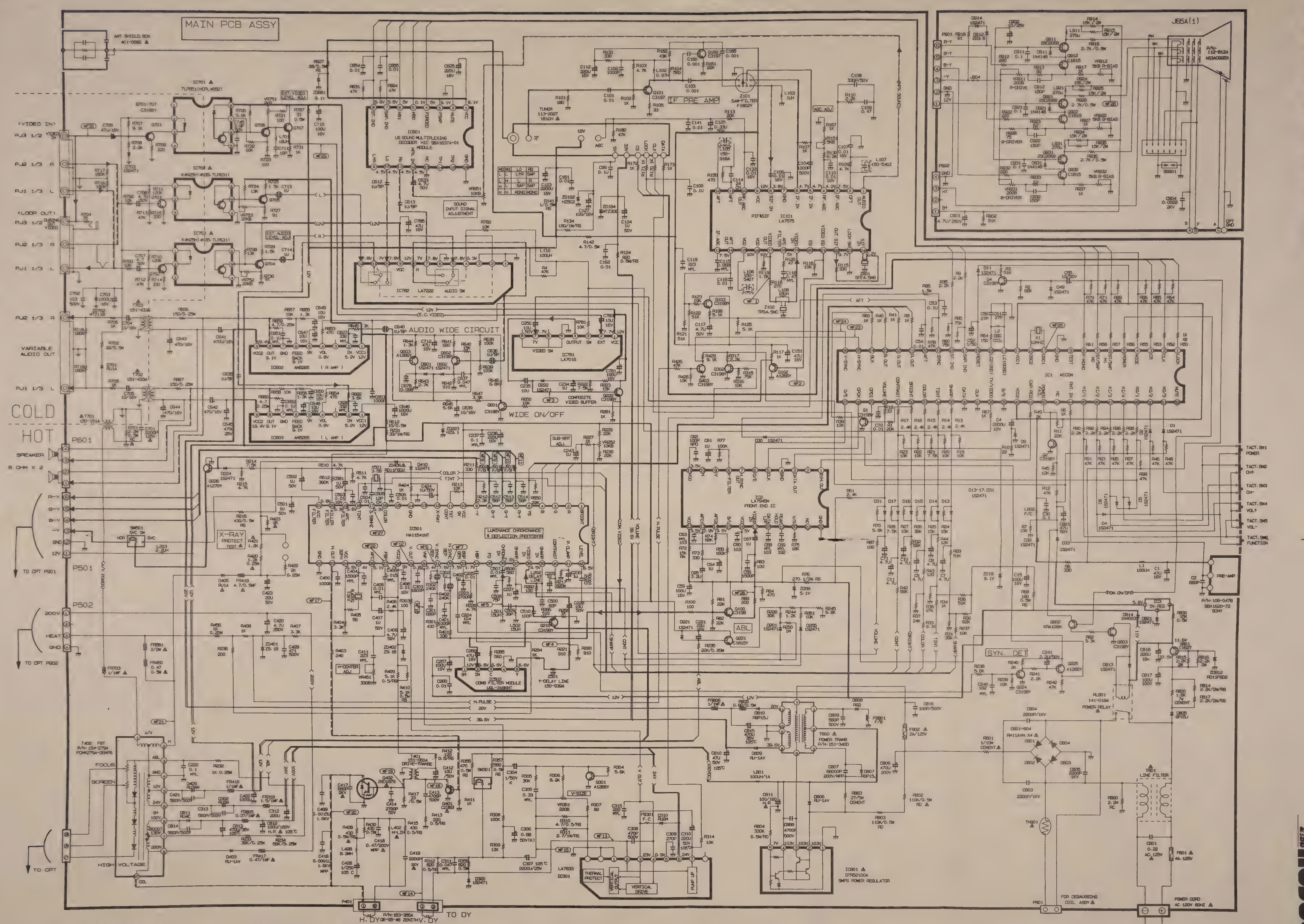
CODE NO : 38104-182-140-00

JC Penney

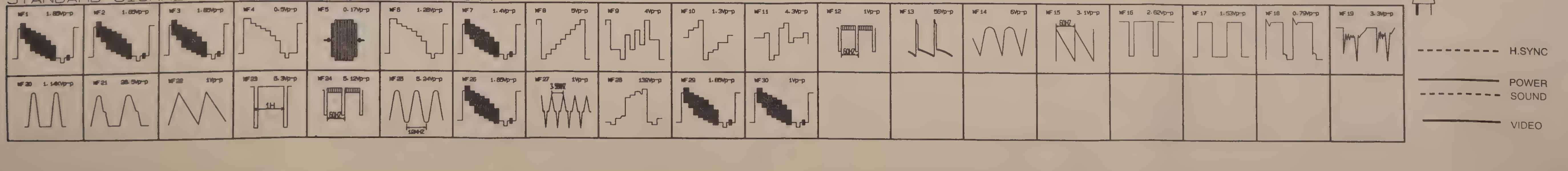
Main Schematic



JC Penney TV Model 2294



STANDARD SIGNAL : 7 STEP COLOR BAR PATTERN



Reprinted by permission of JC Penney

Copyright 1995, CQ Communications, 76 N Broadway, Hicksville, NY 11801

Main Schematic Diagram (1049)

Product safety should be considered when component replacement is made in any area of an electronics product. A star next to a component symbol number designates components in which safety is of special significance. It is recommended that only exact cataloged parts be used for replacement of these components.

Use of substitute replacement parts that do not have the same safety characteristics as recommended in factory service information may create shock, fire, excessive x-radiation or other hazards.

This schematic is for the use of qualified technicians only. This instrument contains no user-serviceable parts.

The other portions of this schematic may be found on other Profax pages.

All integrated circuits and many other semiconductors are electrostatically sensitive and require special handling techniques.

PROFAX 3133
Manufacturers' schematics
Main Schematic Diagram (1049)
Product safety should be considered when component replacement is made in any area of an electronics product. A star next to a component symbol number designates components in which safety is of special significance. It is recommended that only exact cataloged parts be used for replacement of these components.
Use of substitute replacement parts that do not have the same safety characteristics as recommended in factory service information may create shock, fire, excessive x-radiation or other hazards.
This schematic is for the use of qualified technicians only. This instrument contains no user-serviceable parts.
The other portions of this schematic may be found on other Profax pages.
All integrated circuits and many other semiconductors are electrostatically sensitive and require special handling techniques.

PROFAX

esET Manufacturers' schematics

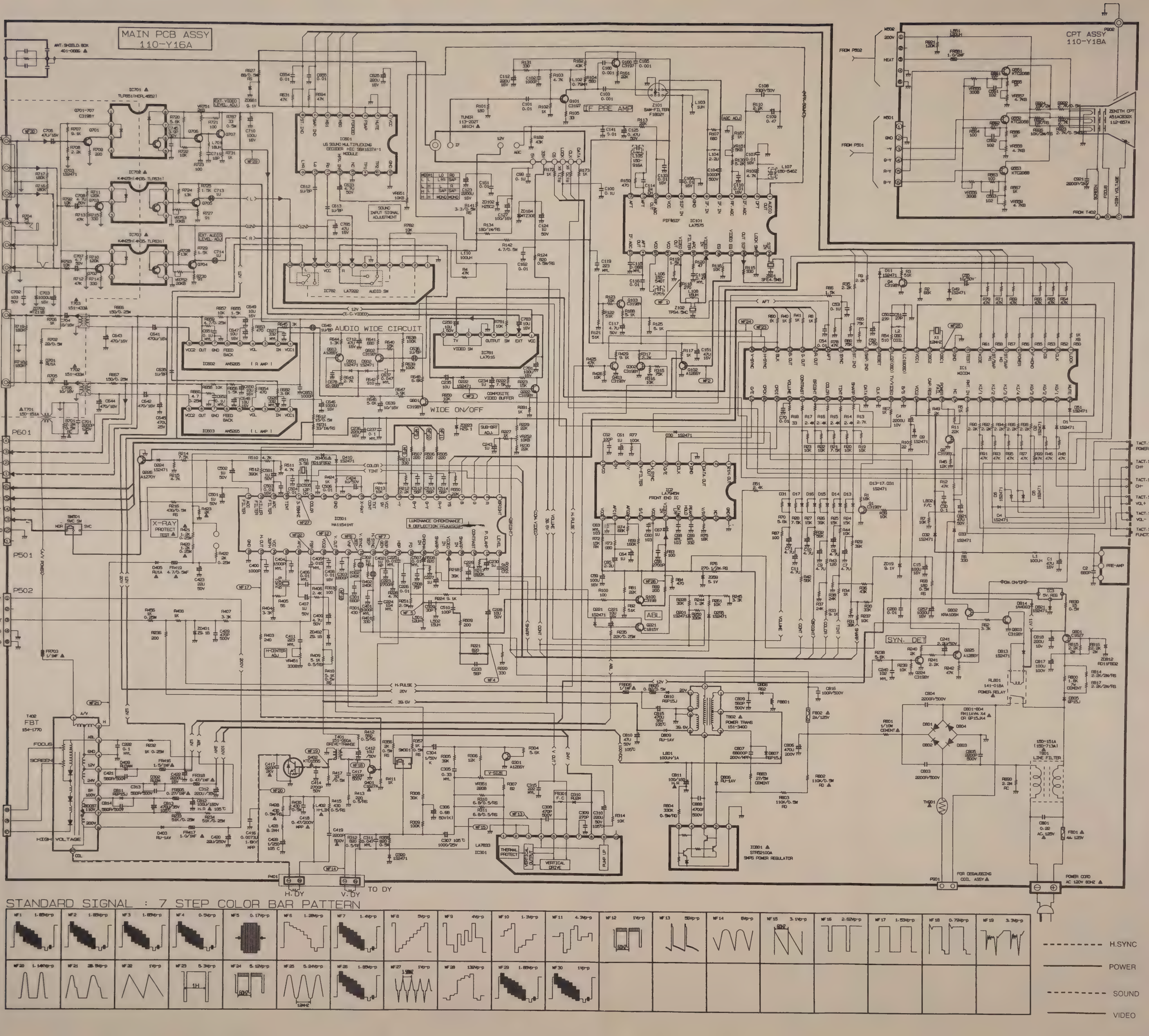
JC Penney Color TV
Model No. 1048/1049

December 1995

Main Schematic Diagram (1048)

Product safety should be considered when component replacement is made in any area of an electronics product. A star next to a component symbol number designates components in which safety is of special significance. It is recommended that only exact cataloged parts be used for replacement of these components.

Use of substitute replacement parts that do not have the same safety characteristics as recommended in factory service information may create shock, fire, excessive x-radiation or other hazards.



Main Schematic Diagram (1048)

This schematic is for the use of qualified technicians only. This instrument contains no user-serviceable parts.

The other portions of this schematic may be found on other Profax pages.

All integrated circuits and many other semiconductors are electrostatically sensitive and require special handling techniques.

esET Manufacturers' schematics

PROFAX 3133

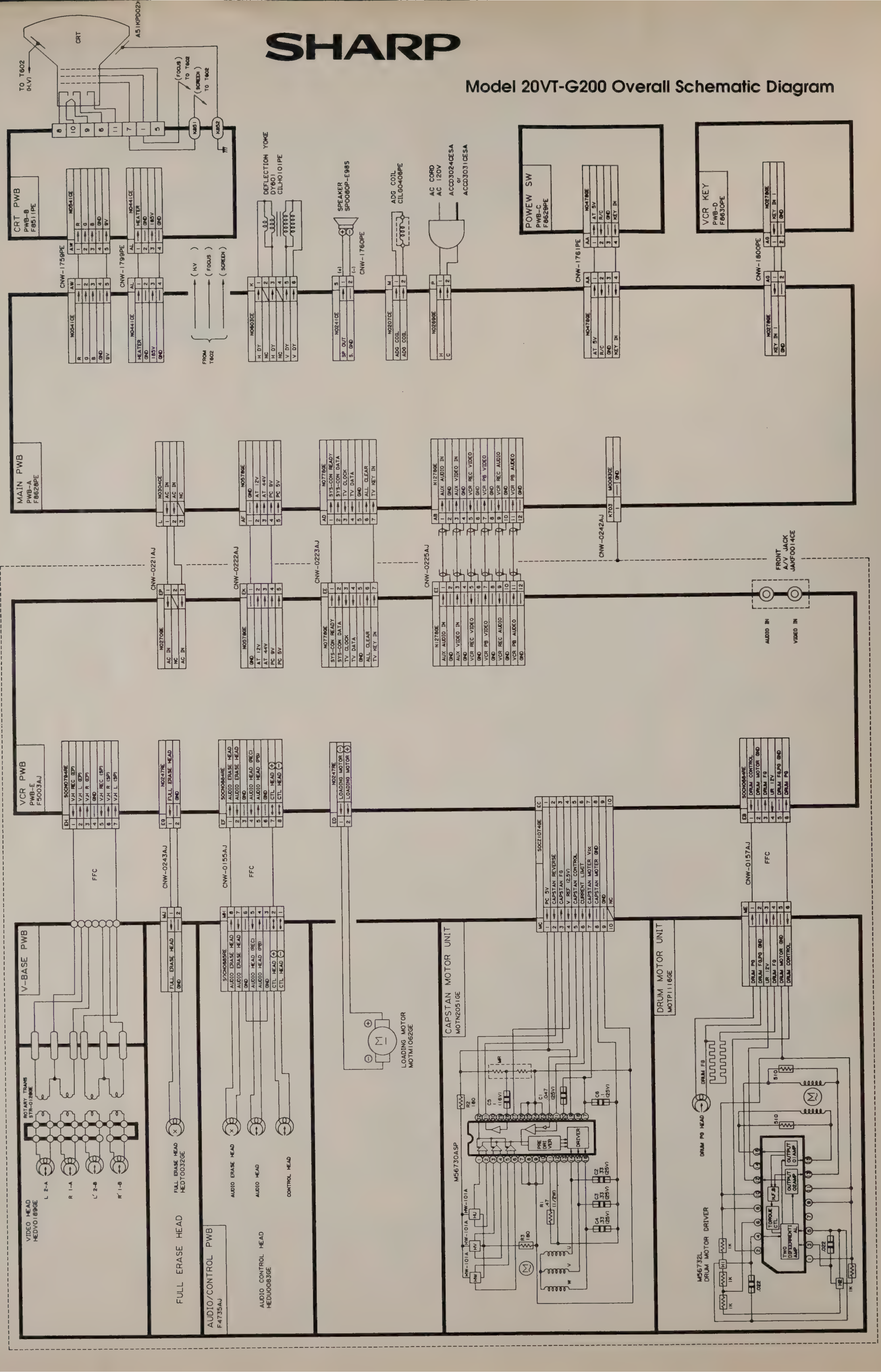
PULL OUT TO OPEN

Reprinted by permission of JC Penney

Copyright 1996, CQ Communications, 76 N. Broadway, Hicksville, NY 11801

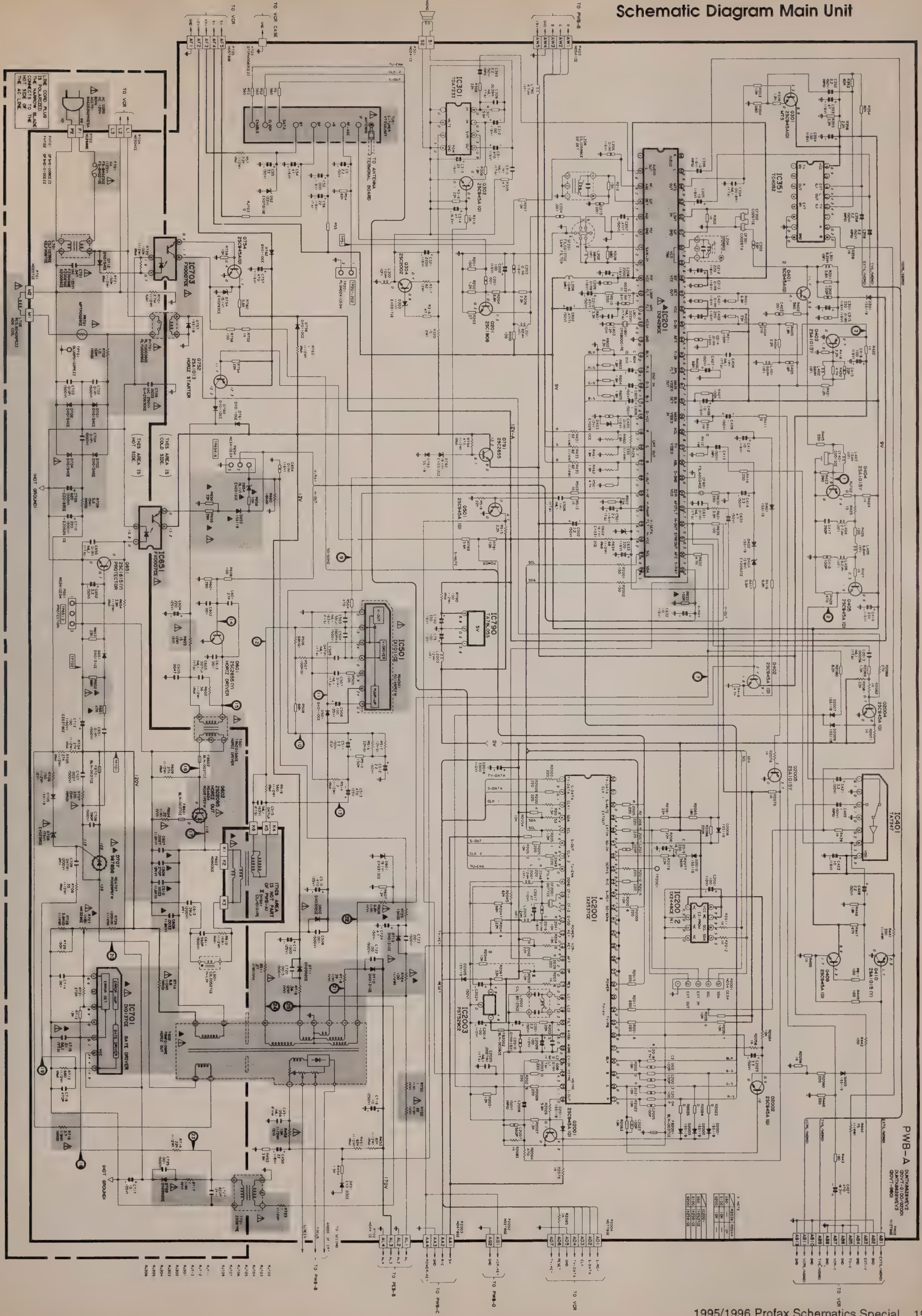
SHARP

Model 20VT-G200 Overall Schematic Diagram

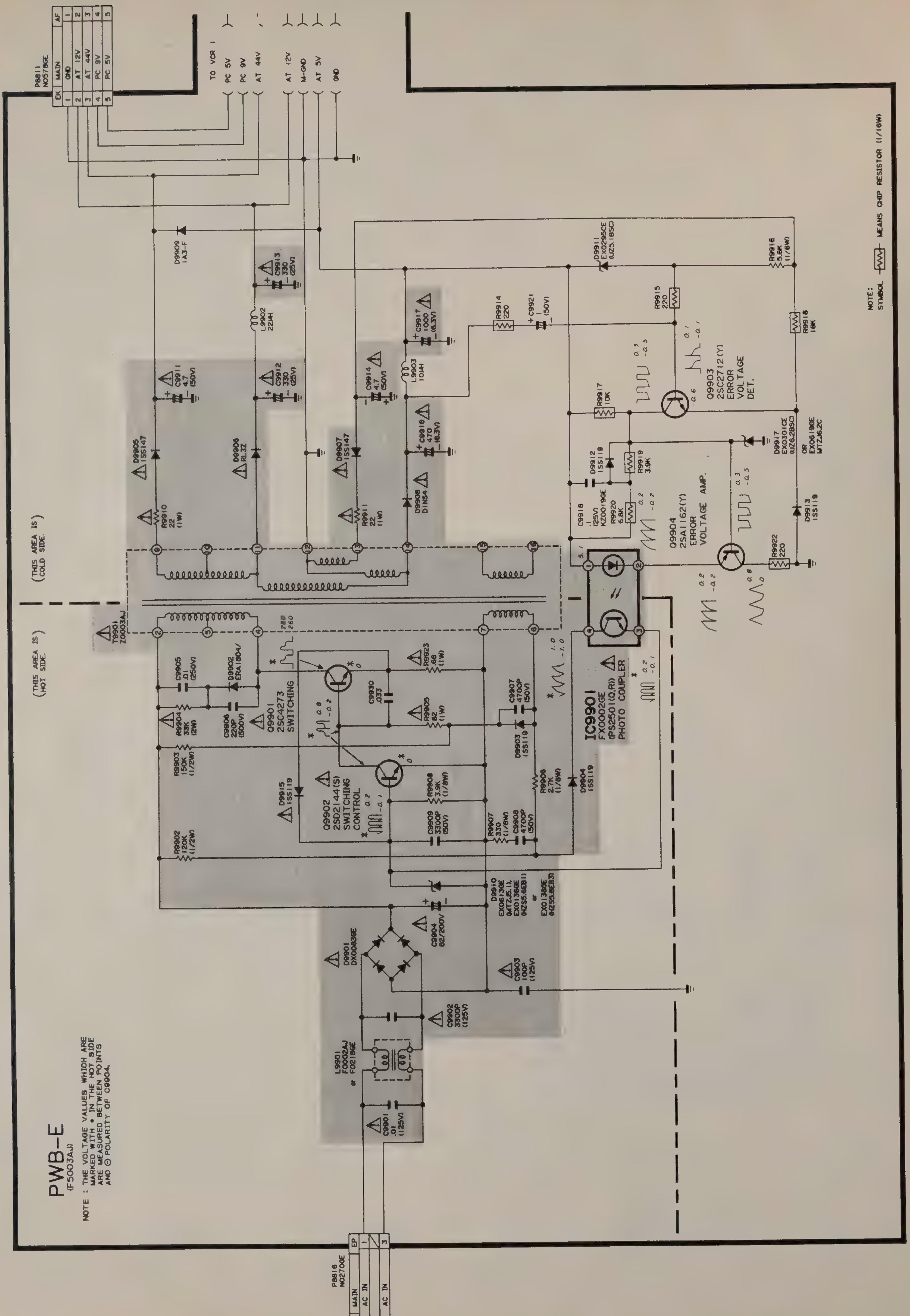


Schematic Diagram Main Unit

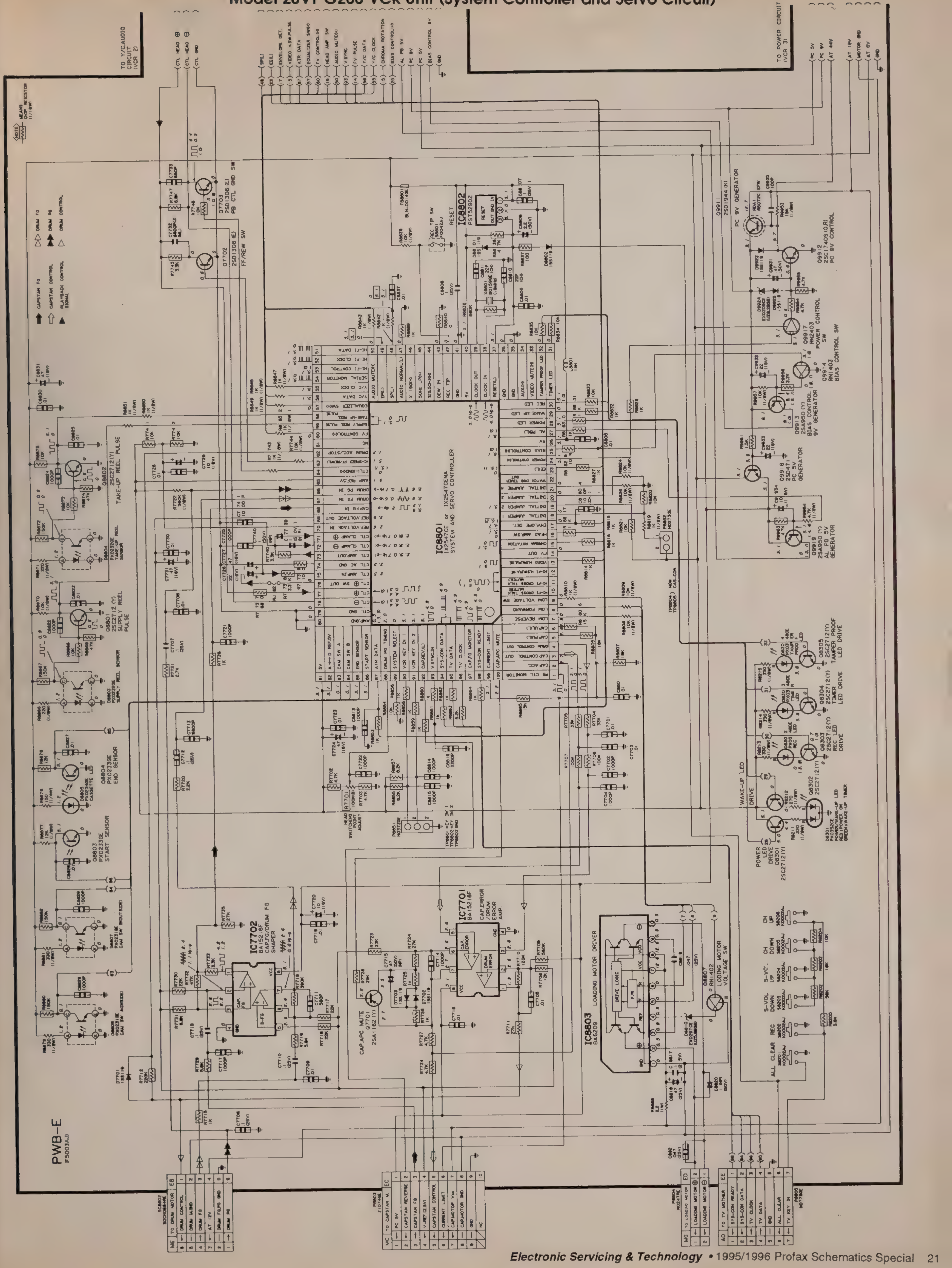
Sharp TV/VCR Models 20VT-G60, 20VT-G100, 20VT-G200



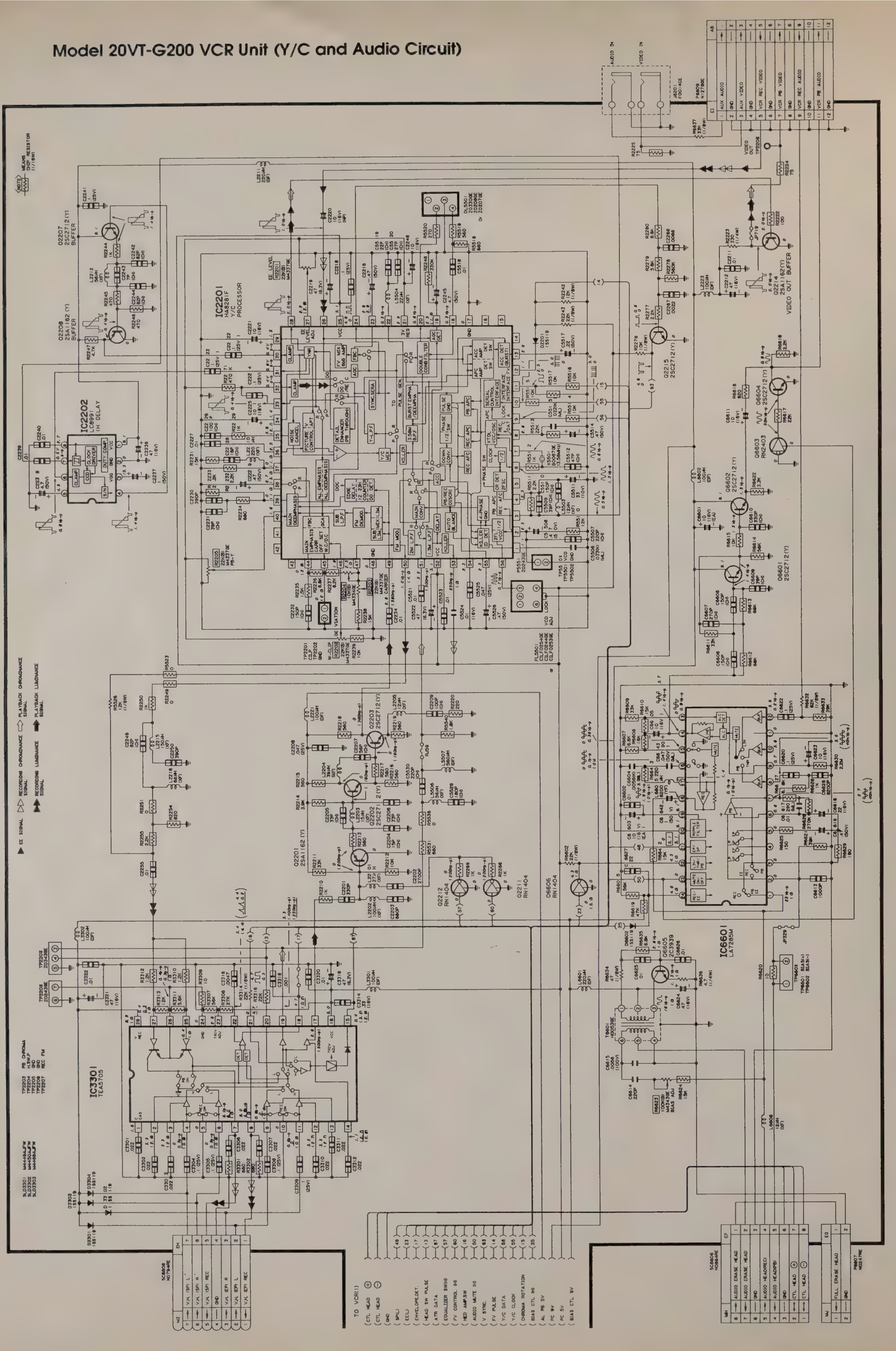
Model 20VT-G60/100 VCR Unit (Power Circuit)



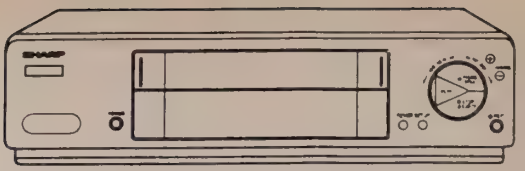
Model 20VT-G200 VCR Unit (System Controller and Servo Circuit)


TO Y/C/AUDIO CIRCUIT (VCR 2)
TO POWER CIRCUIT (VCR 3)
NOTE MEANS CHIP RESISTOR (1/16W)
CAPSTAN FG
CAPSTAN CONTROL
PLAYBACK CONTROL SIGNAL
DRUM FG
DRUM PG
DRUM CONTROL
IC8801 IX2547CE or IX2547CENA SYSTEM AND SERVO CONTROLLER
IC8802 PST529D2 RESET
IC7702 BA1521BF CAP.FG/DRUM FG SHAPER
IC7701 BA1521BF CAP.ERROR/DRUM ERROR AMP
IC8803 BA6209 LOADING MOTOR DRIVER
Q7703 2SD1306(E) PB CTL GND SW
Q7702 2SD1306(E) FF/REW SW
Q7701 2SA1162(Y) CAP.APC MUTE
Q8802 2SC2712(Y) TAKE-UP REEL PULSE
Q8801 2SC2712(Y) SUPPLY REEL PULSE
Q8804 PX0233GE END SENSOR
Q8803 PX0233GE START SENSOR
Q9911 2SD1944(K) PC 9V GENERATOR
Q9912 2SC1740S(Q,R) PC 9V CONTROL
Q9917 RN2403 POWER CONTROL SW
Q9914 RN1403 BIAS CONTROL SW
Q9913 2SA950(Y) BIAS CONTROL 9V GENERATOR
Q9918 2SD471 PC 5V GENERATOR
Q9916 2SA950(Y) AL PB 5V GENERATOR
Q8305 2SC2712(Y) TAMPER PROOF LED DRIVE
Q8304 2SC2712(Y) TIMER LED DRIVE
Q8303 2SC2712(Y) REC LED DRIVE
Q8302 2SC2712(Y) WAKE-UP LED DRIVE
Q8301 2SC2712(Y) POWER LED DRIVE
Q8807 RN1402 LOADING MOTOR VOLTAGE SW
ALL CLEAR
REC
S-VOL DOWN
S-VOL UP
CH DOWN
CH UP
HEAD SWITCHING POINT ADJUST
PWB-E (F5003AJ)
SC8802
P8803
P8804
P8805

Model 20VT-G200 VCR Unit (Y/C and Audio Circuit)

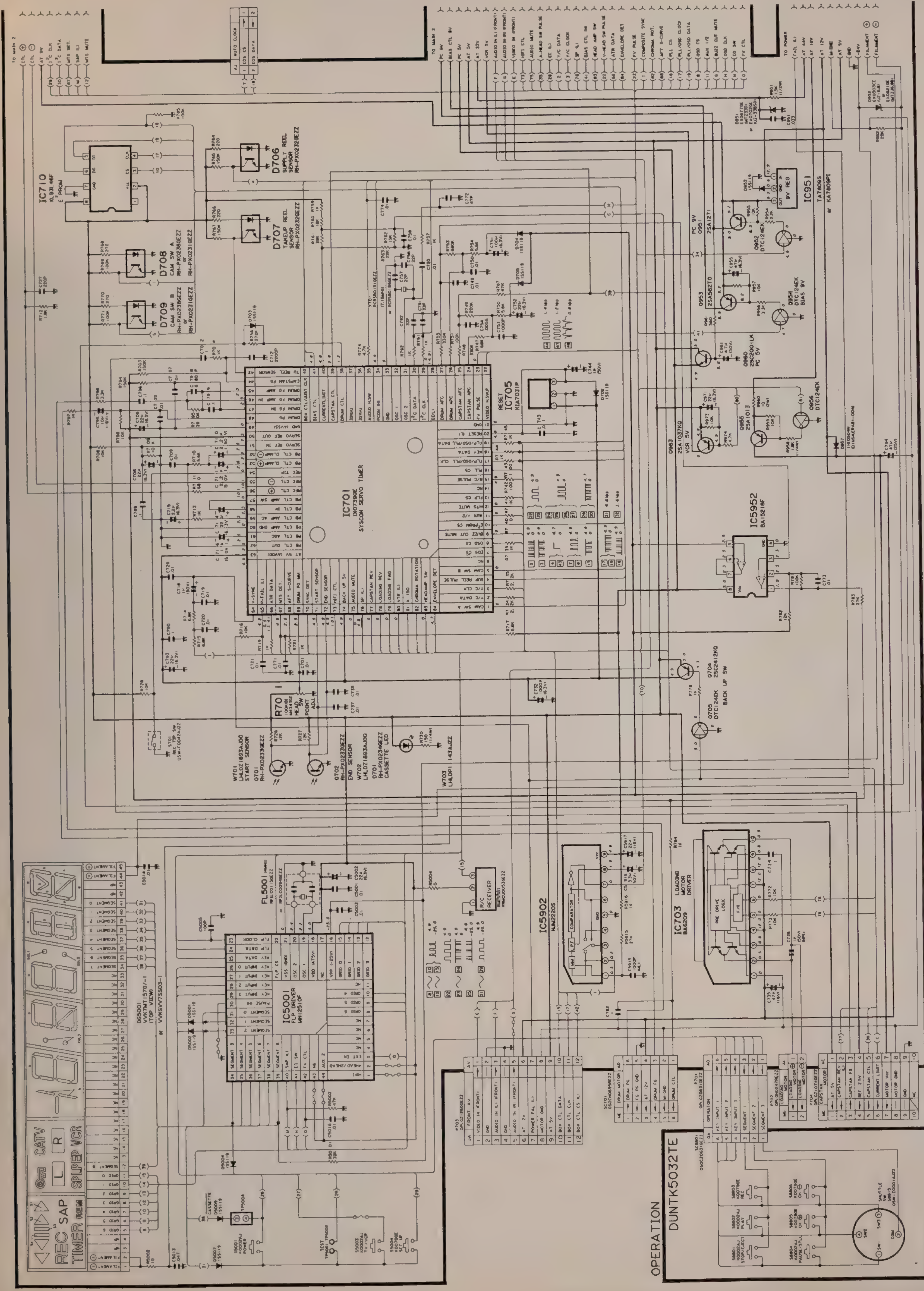


SHARP

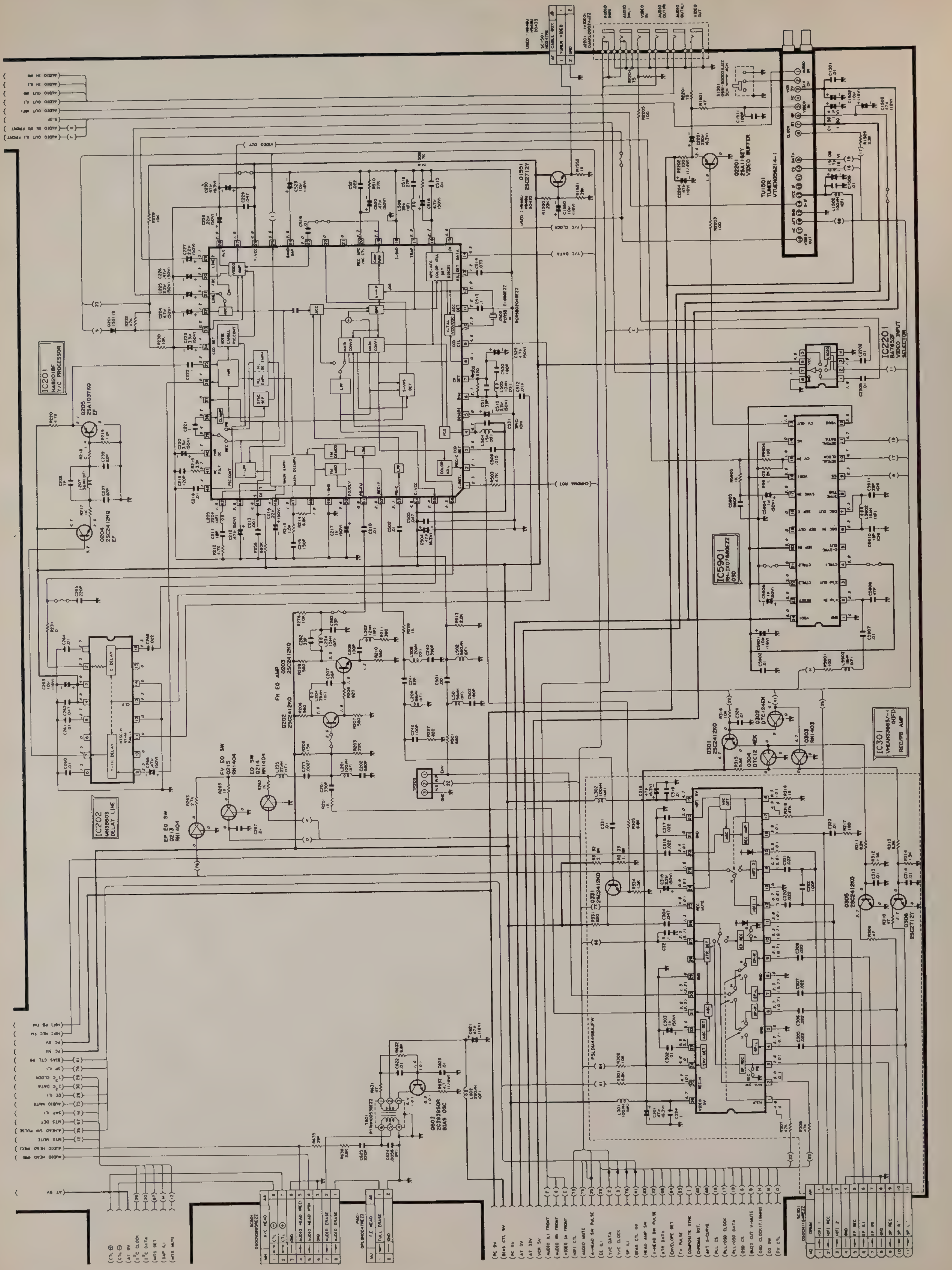


Main Circuit (1) and Operation Circuit

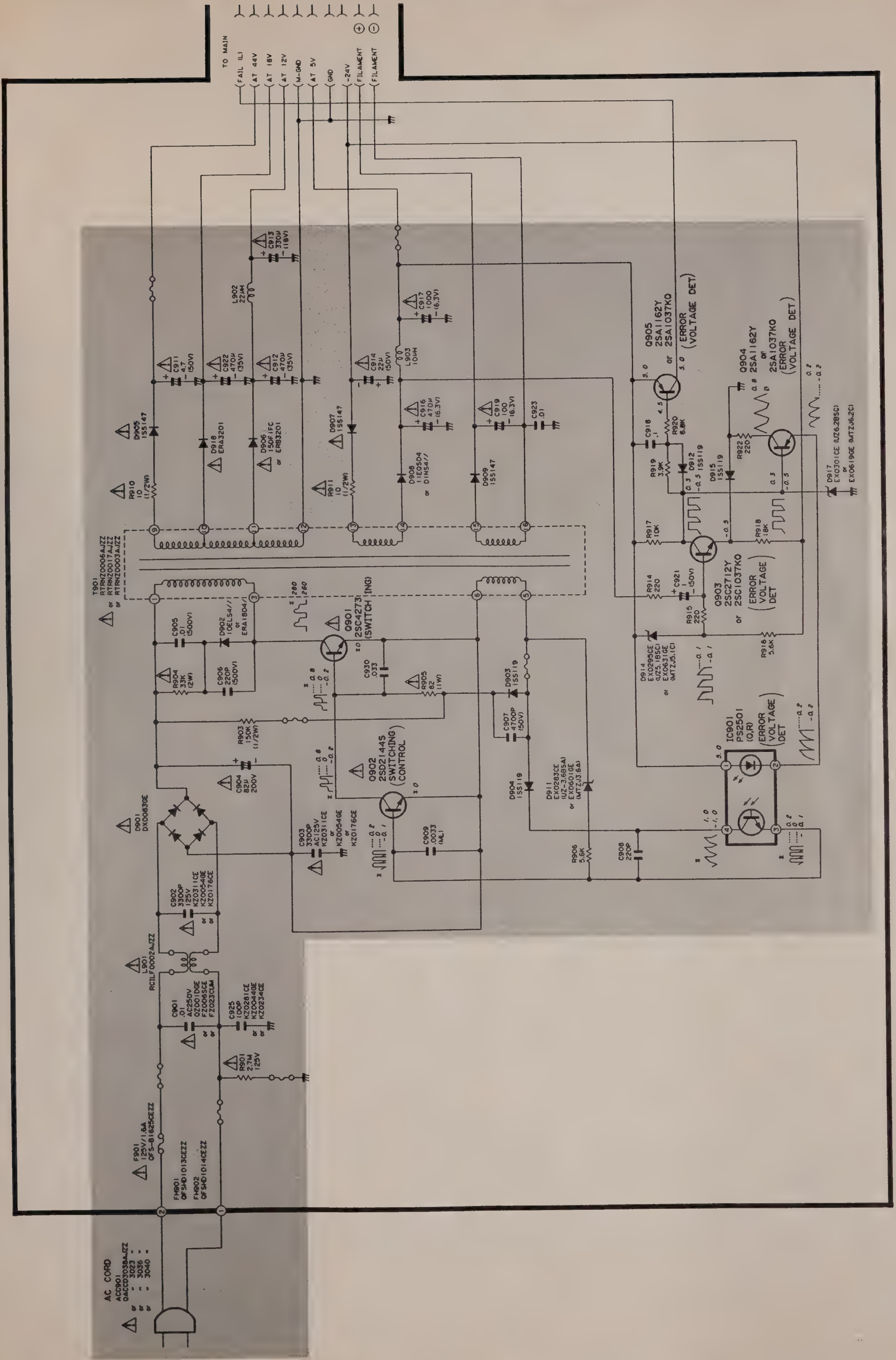
Sharp VCR Models VC-H946U, VC-H948U



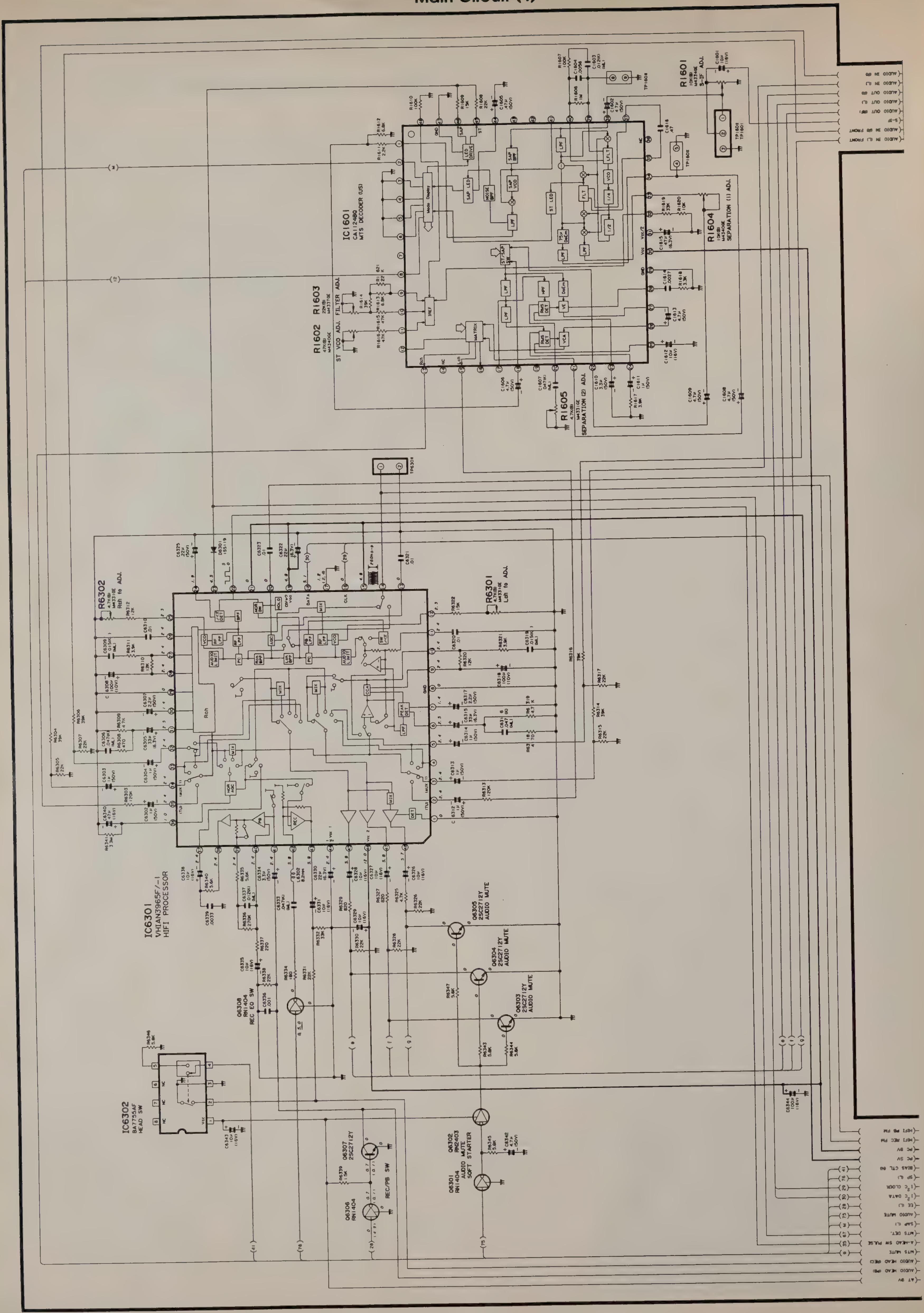
Main Circuit (2)



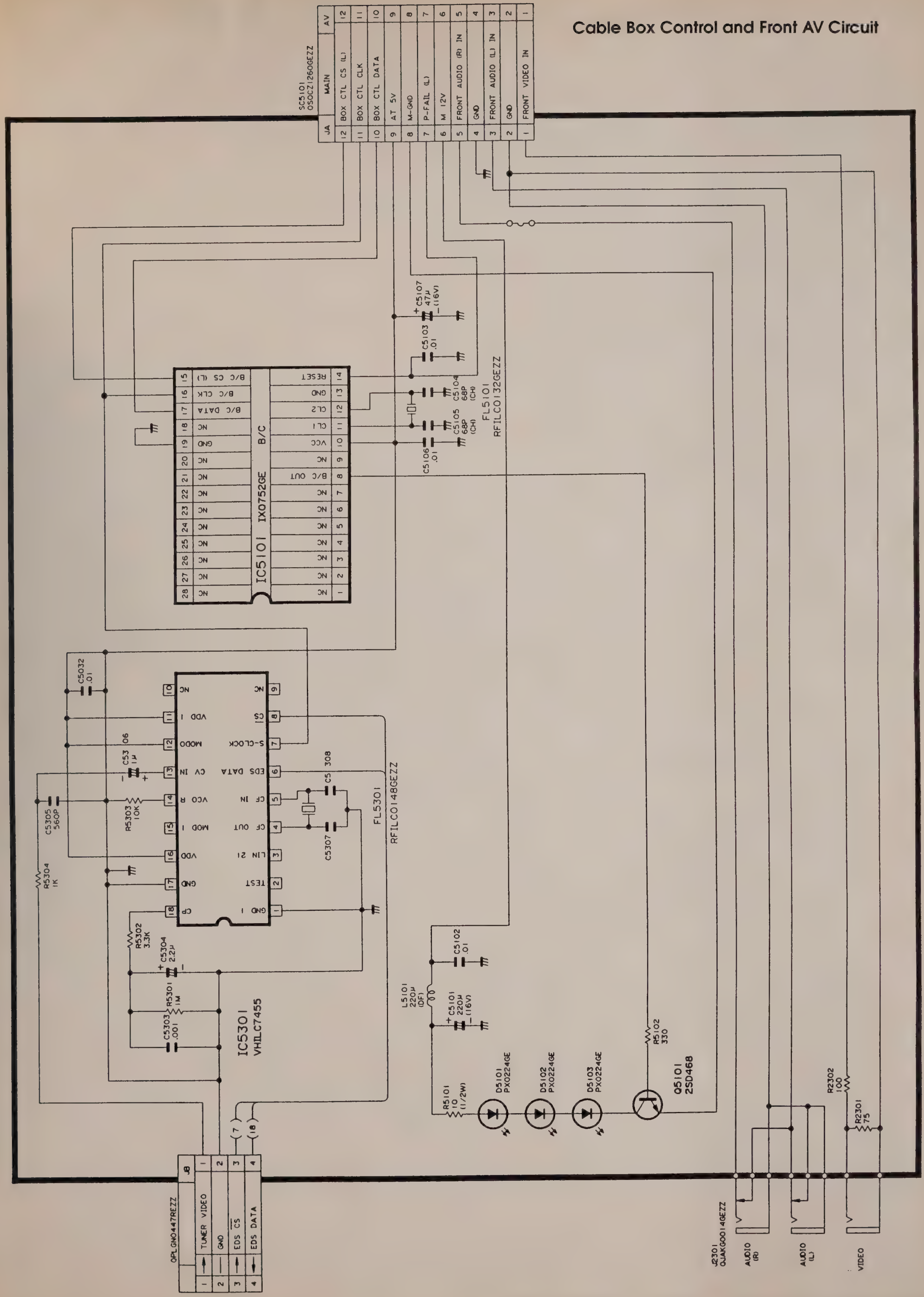
Main Circuit(3) Power Section

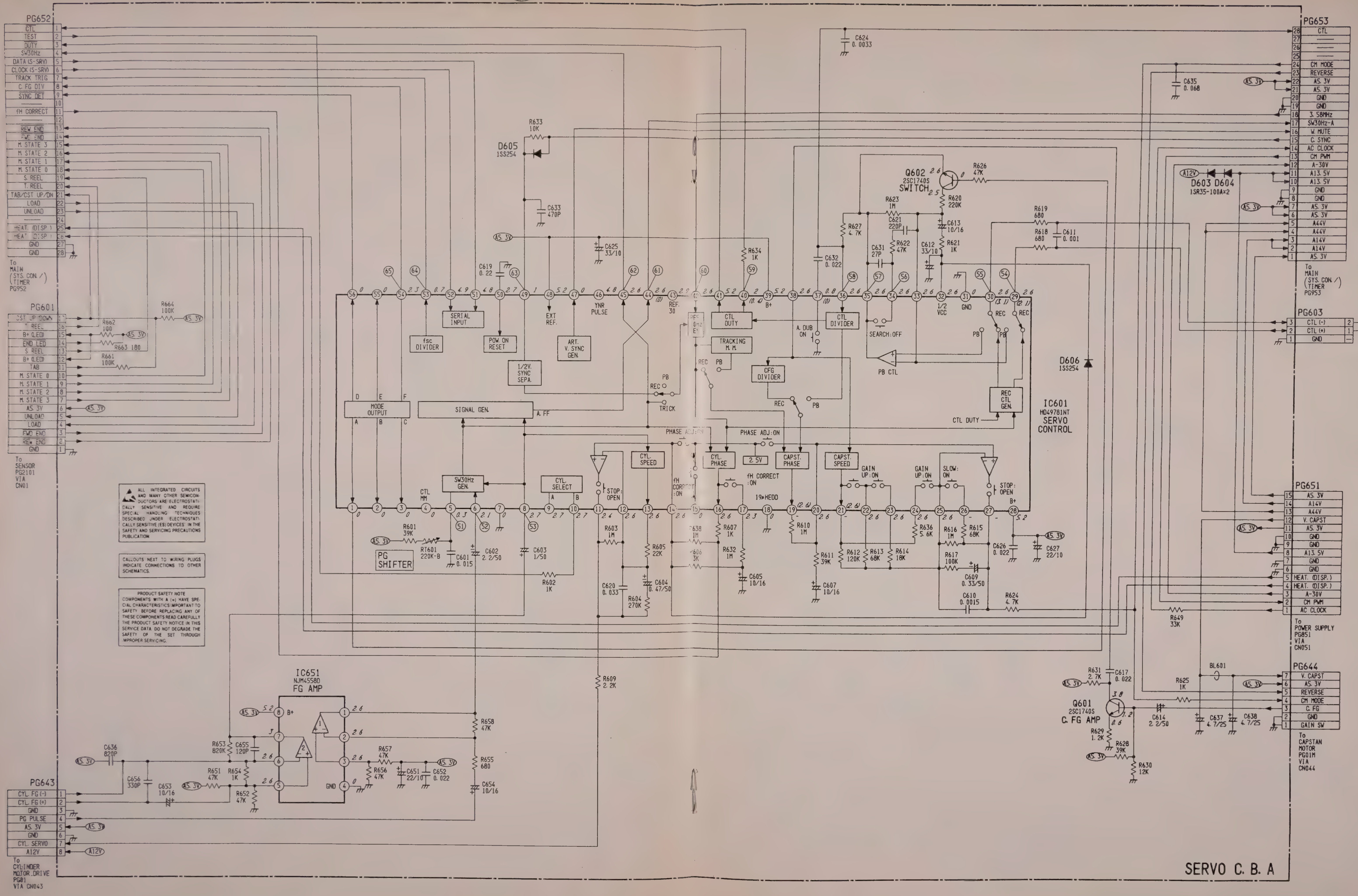


Main Circuit (4)



Cable Box Control and Front AV Circuit





ALL INTEGRATED CIRCUITS AND MANY OTHER SEMICONDUCTORS ARE ELECTROSTATICALLY SENSITIVE AND REQUIRE SPECIAL HANDLING TECHNIQUES DESCRIBED UNDER ELECTROSTATICALLY SENSITIVE (ES) DEVICES IN THE SAFETY AND SERVICING PRECAUTIONS PUBLICATION.

CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATICS.

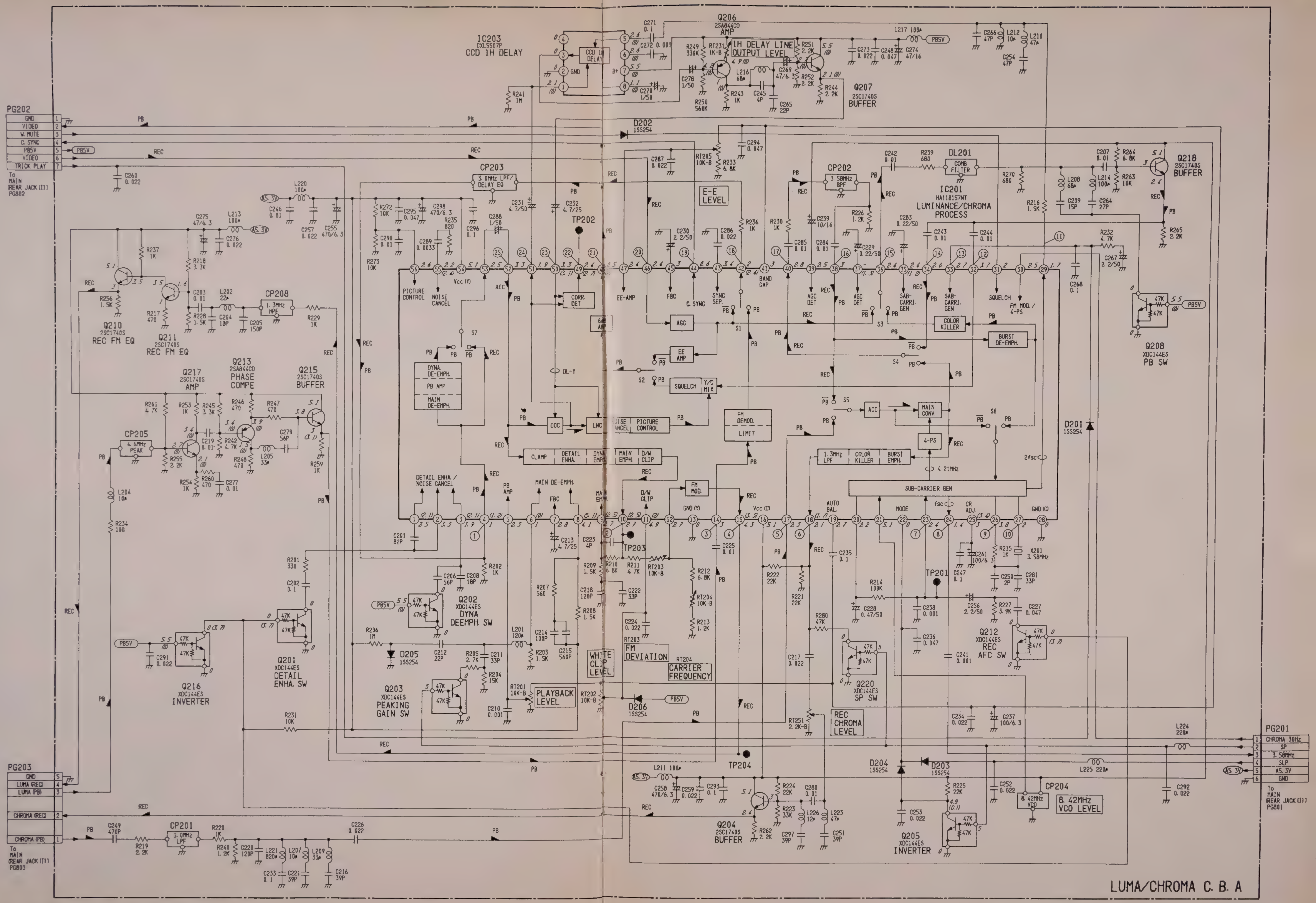
PRODUCT SAFETY NOTE

COMPONENTS WITH A (★) HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA. DO NOT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

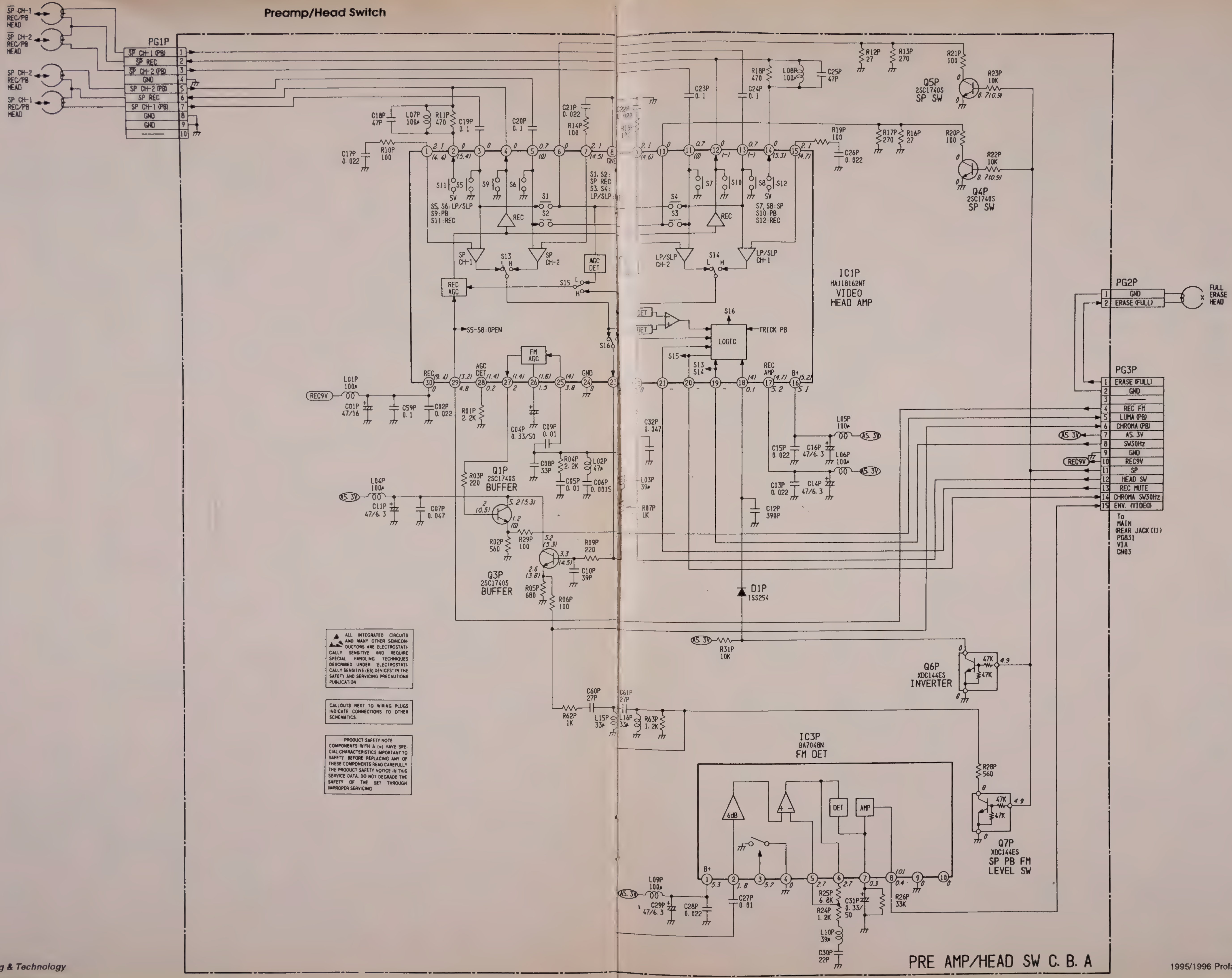
ALL INTEGRATED CIRCUITS AND MANY OTHER SEMICONDUCTORS ARE ELECTROSTATICALLY SENSITIVE AND REQUIRE SPECIAL HANDLING TECHNIQUES DESCRIBED UNDER ELECTROSTATICALLY SENSITIVE (ES) DEVICES IN THE SAFETY AND SERVICING PRECAUTIONS PUBLICATION

CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATICS.

PRODUCT SAFETY NOTE
COMPONENTS WITH A (*) HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA. DO NOT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.



Preamp/Head Switch



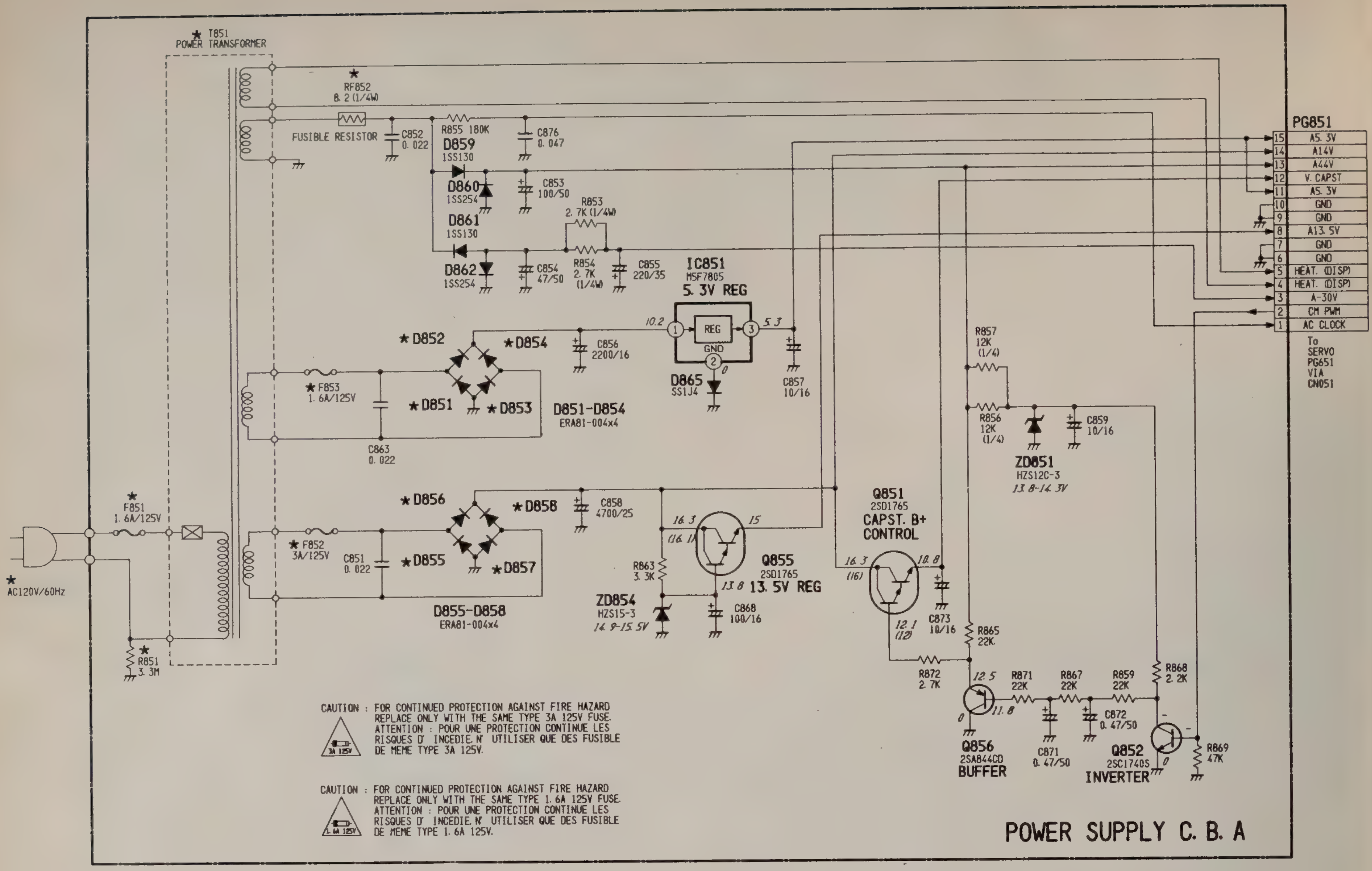
ALL INTEGRATED CIRCUITS AND MANY OTHER SEMICONDUCTORS ARE ELECTROSTATICALLY SENSITIVE AND REQUIRE SPECIAL HANDLING TECHNIQUES DESCRIBED UNDER "ELECTROSTATICALLY SENSITIVE (ES) DEVICES" IN THE SAFETY AND SERVICING PRECAUTIONS PUBLICATION

CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATICS.

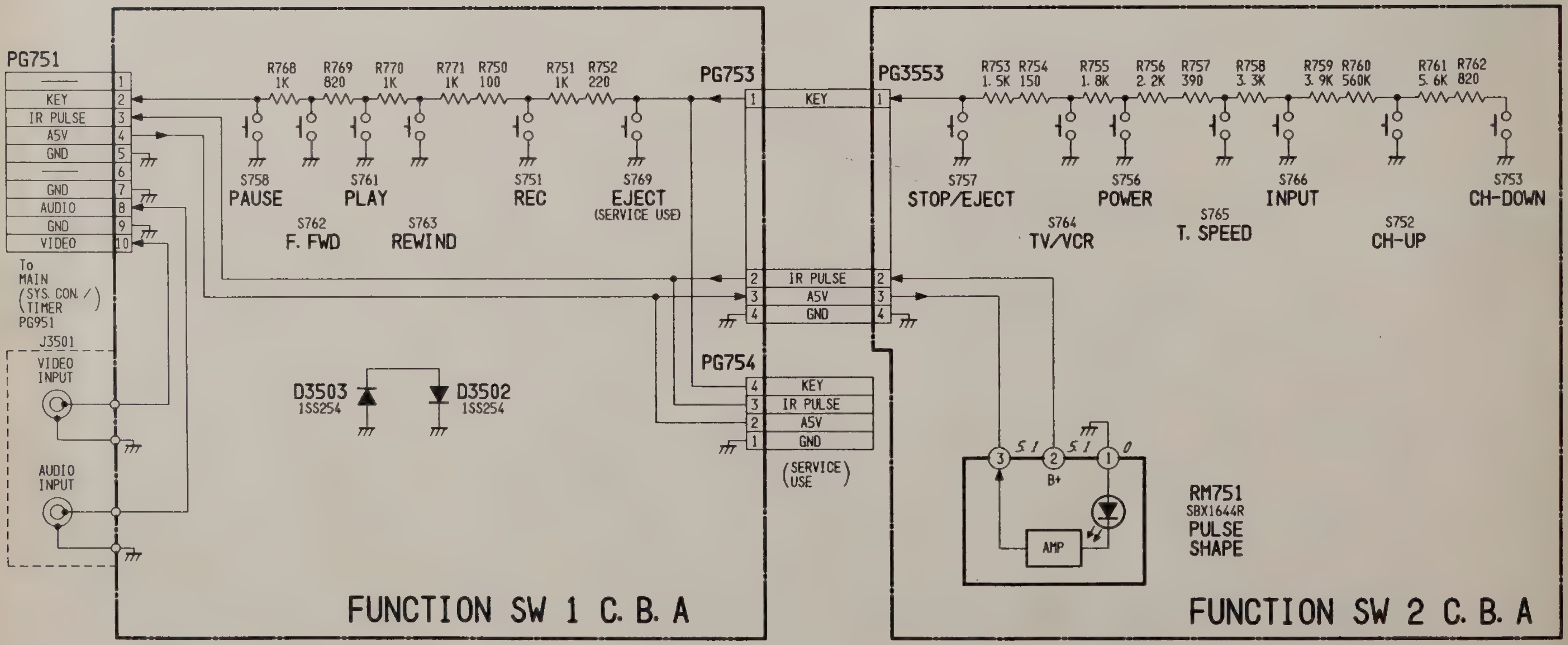
PRODUCT SAFETY NOTE

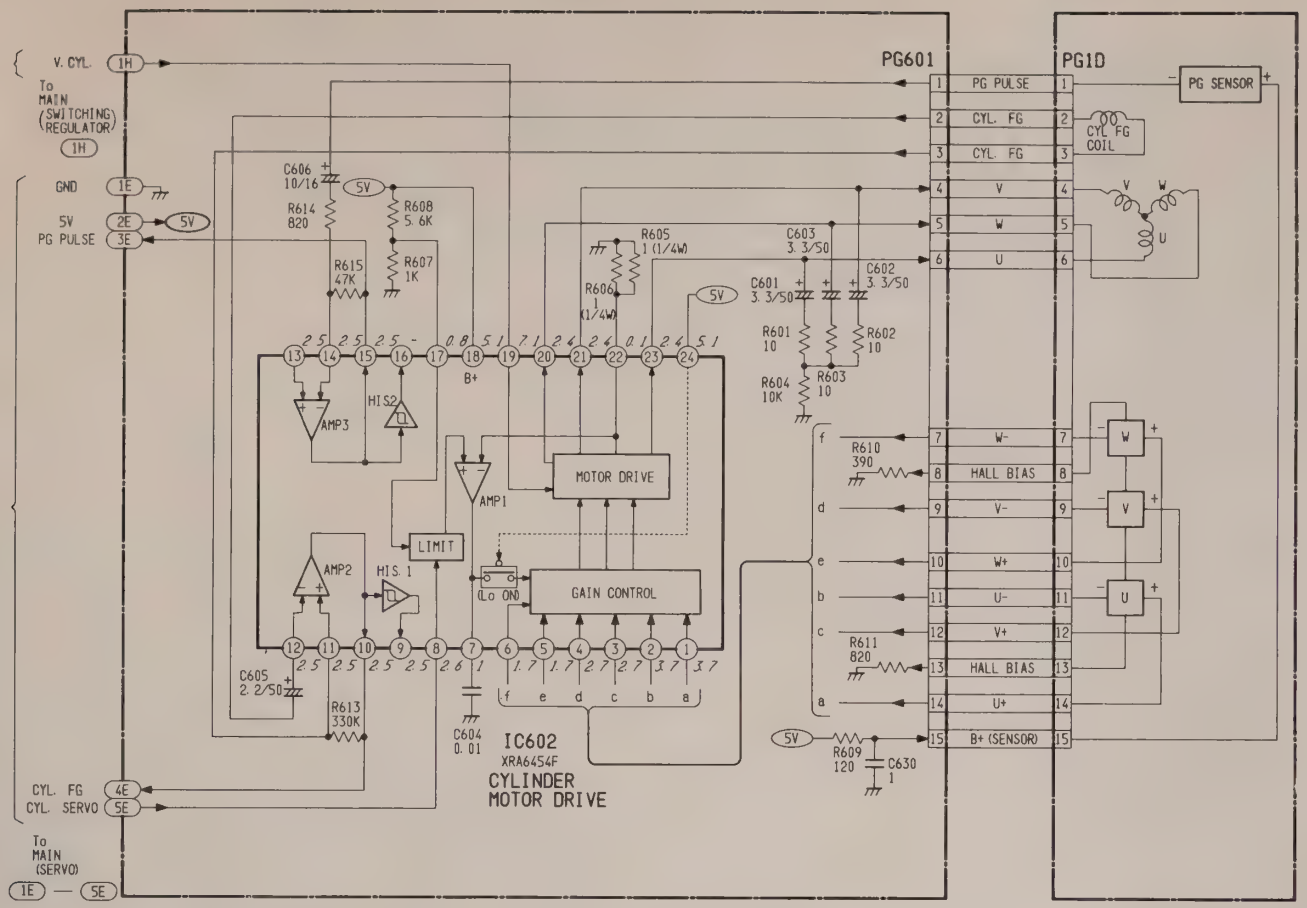
COMPONENTS WITH A (*) HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA. DO NOT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

Power Supply

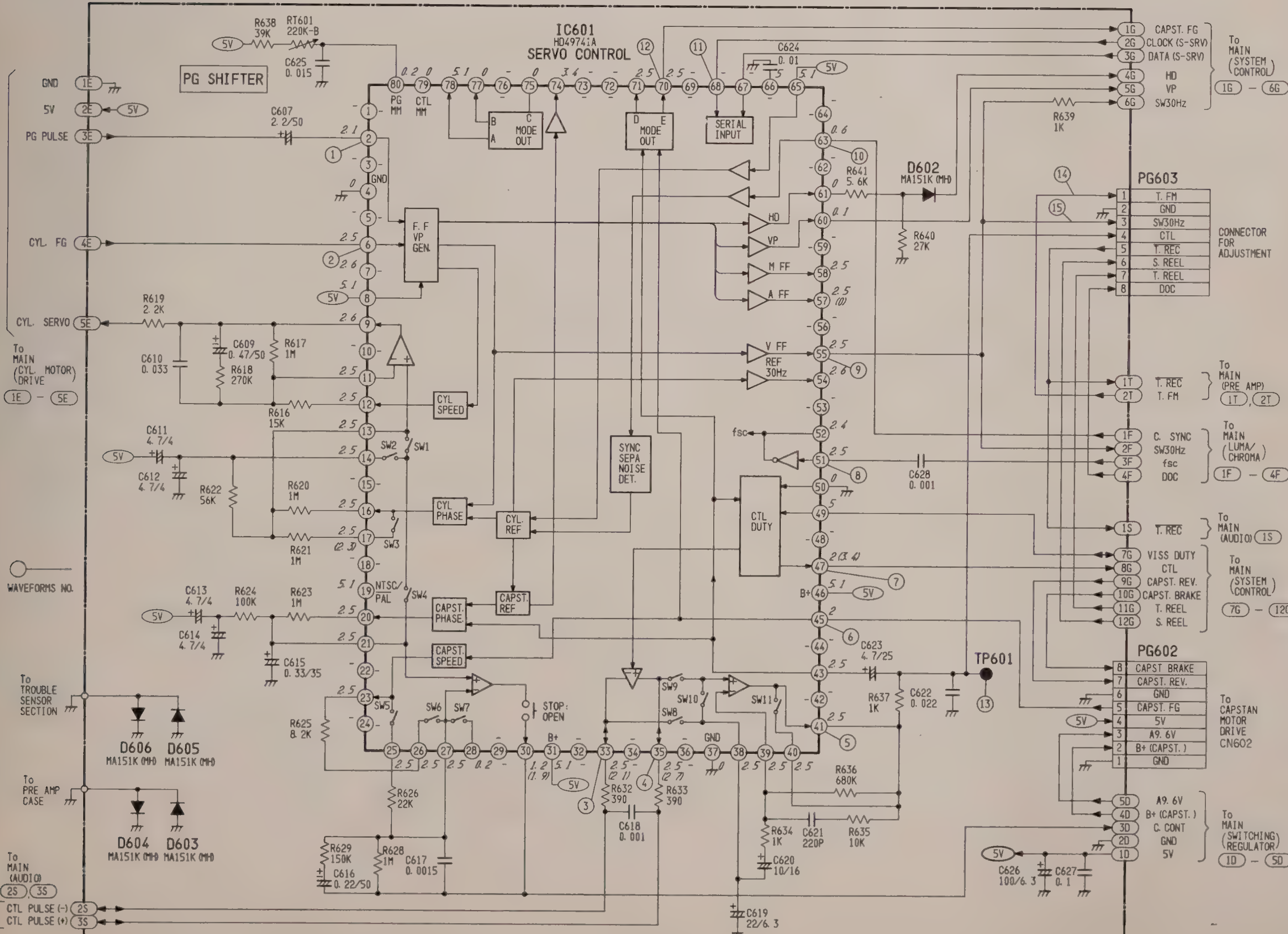


FUNCTION SWITCH SCHEMATIC

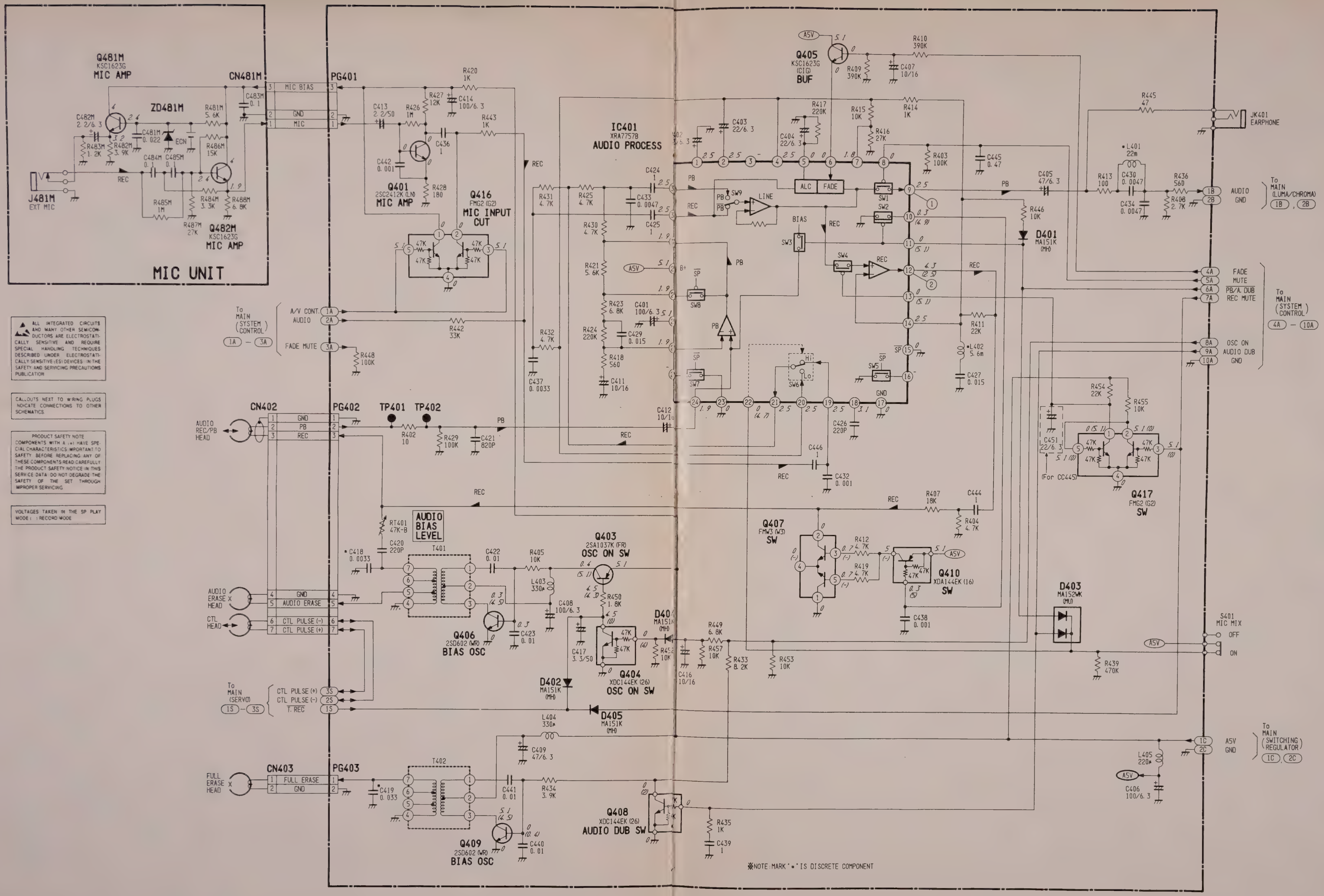



V. CYL.
To MAIN (SWITCHING REGULATOR)
GND
5V
PG PULSE
CYL. FG
CYL. SERVO
To MAIN (SERVO)
PG601
PG1D
PG PULSE
CYL. FG
V
W
U
HALL BIAS
W-
V-
W+
U-
V+
U+
B+ (SENSOR)
PG SENSOR
CYL FG COIL
AMP1
AMP2
AMP3
HIS. 1
HIS2
LIMIT
MOTOR DRIVE
GAIN CONTROL
Lo ON
IC602
XRA6454F
CYLINDER MOTOR DRIVE
R605 1 (1/4W)
R606 1 (1/4W)
R601 10
R602 10
R603 10
R604 10K
R607 1K
R608 5.6K
R609 120
R610 390
R611 820
R613 330K
R614 820
R615 47K
C601 3.3/50
C602 3.3/50
C603 3.3/50
C604 0.01
C605 2.2/50
C606 10/16
C630 1

Servo


IC601
HD49741A
SERVO CONTROL
PG SHIFTER
GND
5V
PG PULSE
CYL. FG
CYL. SERVO
To MAIN (CYL. MOTOR DRIVE)
WAVEFORMS NO.
To TROUBLE SENSOR SECTION
To PRE AMP CASE
To MAIN (AUDIO)
CTL PULSE (-)
CTL PULSE (+)
D606 MA151K
D605 MA151K
D604 MA151K
D603 MA151K
D602 MA151K
F.F VP GEN.
MODE OUT
SERIAL INPUT
CYL SPEED
CYL PHASE
CYL REF
CAPST. PHASE
CAPST. REF
CAPST. SPEED
SYNC SEPA NOISE DET.
CTL DUTY
NTSC/PAL
STOP: OPEN
HD
VP
M FF
A FF
V FF
REF 30Hz
fsc
TP601
CAPST. FG
CLOCK (S-SRV)
DATA (S-SRV)
SW30Hz
To MAIN (SYSTEM CONTROL)
PG603
T. FM
CTL
T. REC
S. REEL
T. REEL
DOC
CONNECTOR FOR ADJUSTMENT
To MAIN (PRE AMP)
C. SYNC
To MAIN (LUMA/CHROMA)
To MAIN (AUDIO)
VISS DUTY
CAPST. REV.
CAPST. BRAKE
PG602
A9. 6V
B+ (CAPST.)
To CAPSTAN MOTOR DRIVE CN602
C. CONT
To MAIN (SWITCHING REGULATOR)
R616 15K
R617 1M
R618 270K
R619 2.2K
R620 1M
R621 1M
R622 56K
R623 1M
R624 100K
R625 8.2K
R626 22K
R628 1M
R629 150K
R632 390
R633 390
R634 1K
R635 10K
R636 680K
R637 1K
R638 39K
R639 1K
R640 27K
R641 5.6K
RT601 220K-B
C607 2.2/50
C609 0.47/50
C610 0.033
C611 4.7/4
C612 4.7/4
C613 4.7/4
C614 4.7/4
C615 0.33/35
C616 0.22/50
C617 0.0015
C618 0.001
C619 22/6.3
C620 10/16
C621 220P
C622 0.022
C623 4.7/25
C624 0.01
C625 0.015
C626 100/6.3
C627 0.1
C628 0.001

Audio



ALL INTEGRATED CIRCUITS AND MANY OTHER SEMICONDUCTORS ARE ELECTROSTATICALLY SENSITIVE AND REQUIRE SPECIAL HANDLING TECHNIQUES DESCRIBED UNDER ELECTROSTATICALLY SENSITIVE (ES) DEVICES IN THE SAFETY AND SERVICING PRECAUTIONS PUBLICATION

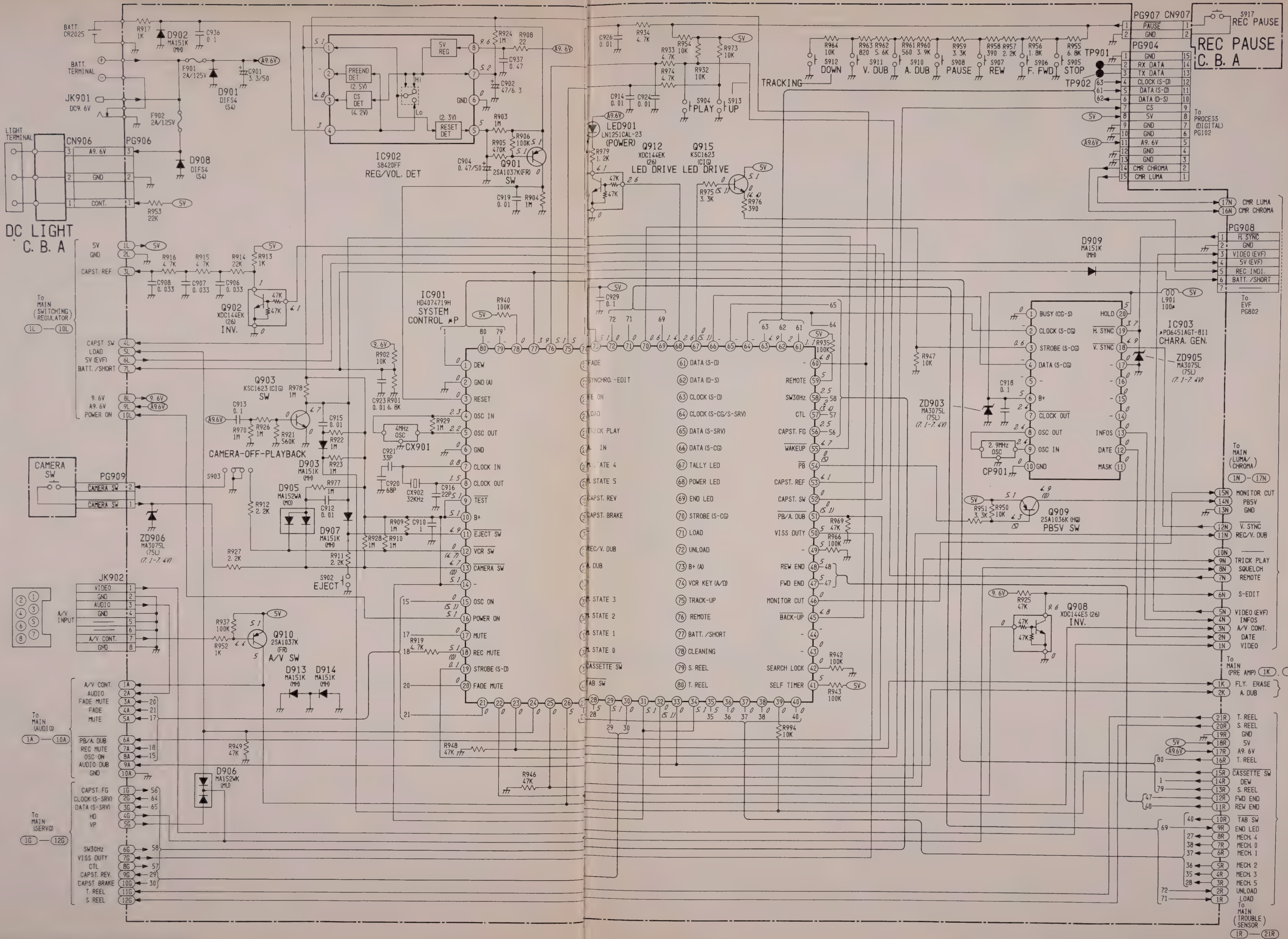
CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATICS.

PRODUCT SAFETY NOTE

COMPONENTS WITH A (•) HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA DO NOT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING

VOLTAGES TAKEN IN THE SP PLAY MODE ( ) RECORD MODE

Sysem Control



ALL INTEGRATED CIRCUITS AND MANY OTHER SEMICONDUCTORS ARE ELECTROSTATICALLY SENSITIVE AND REQUIRE SPECIAL HANDLING TECHNIQUES DESCRIBED UNDER ELECTROSTATICALLY SENSITIVE (ES) DEVICES IN THE SAFETY AND SERVICING PRECAUTIONS PUBLICATION.

CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATICS.

PRODUCT SAFETY NOTE
COMPONENTS WITH A (∗) HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA. DO NOT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

VOLTAGES TAKEN IN THE SP PLAY MODE ( ) RECORD MODE

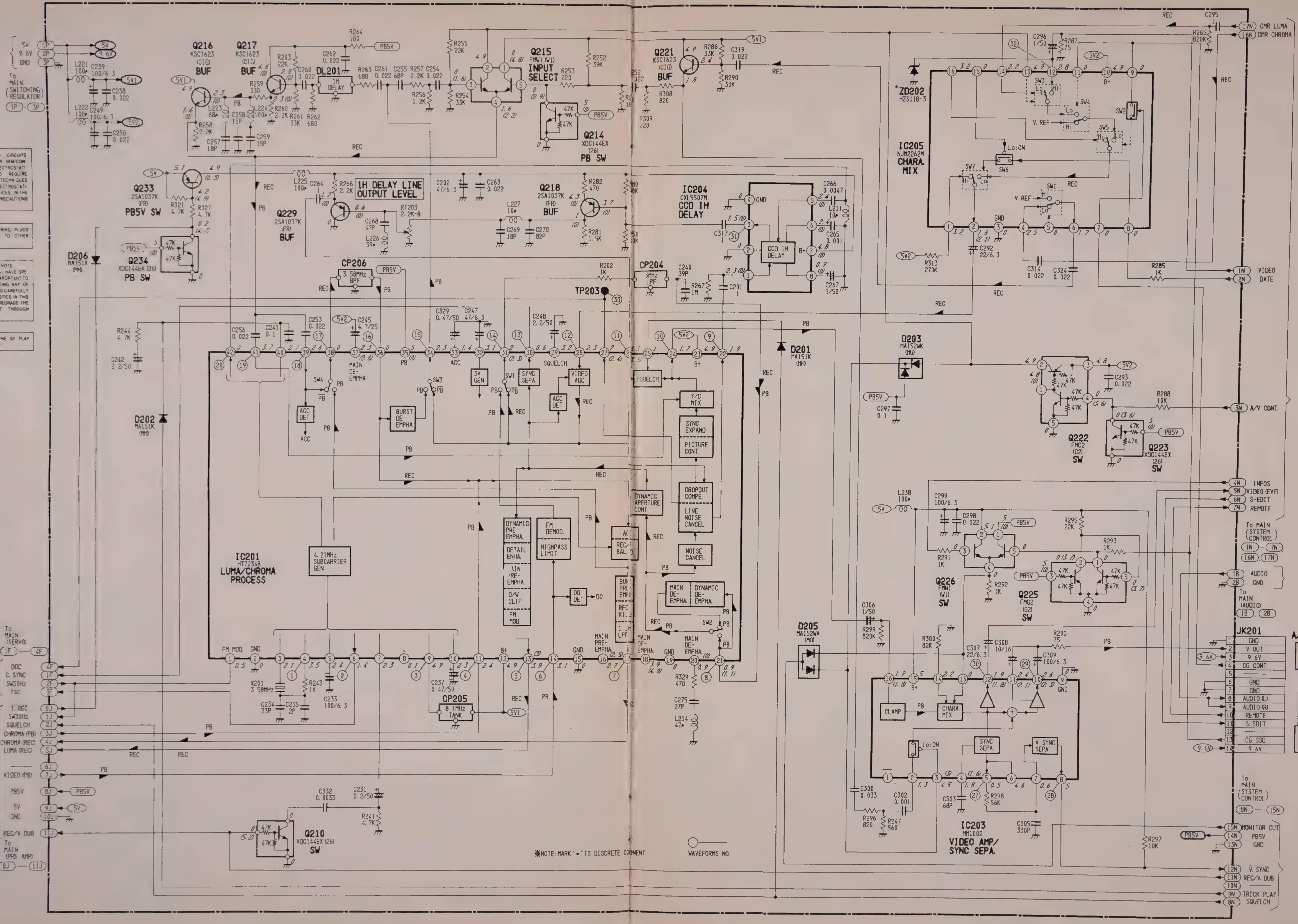
Luna/Chroma

ALL INTEGRATED CIRCUITS AND MANY OTHER SEMICONDUCTORS ARE ELECTROSTATICALLY SENSITIVE AND REQUIRE SPECIAL HANDLING TECHNIQUES DESCRIBED UNDER ELECTROSTATICALLY SENSITIVE (ES) DEVICES IN THE SAFETY AND SERVICING PRECAUTIONS PUBLICATION

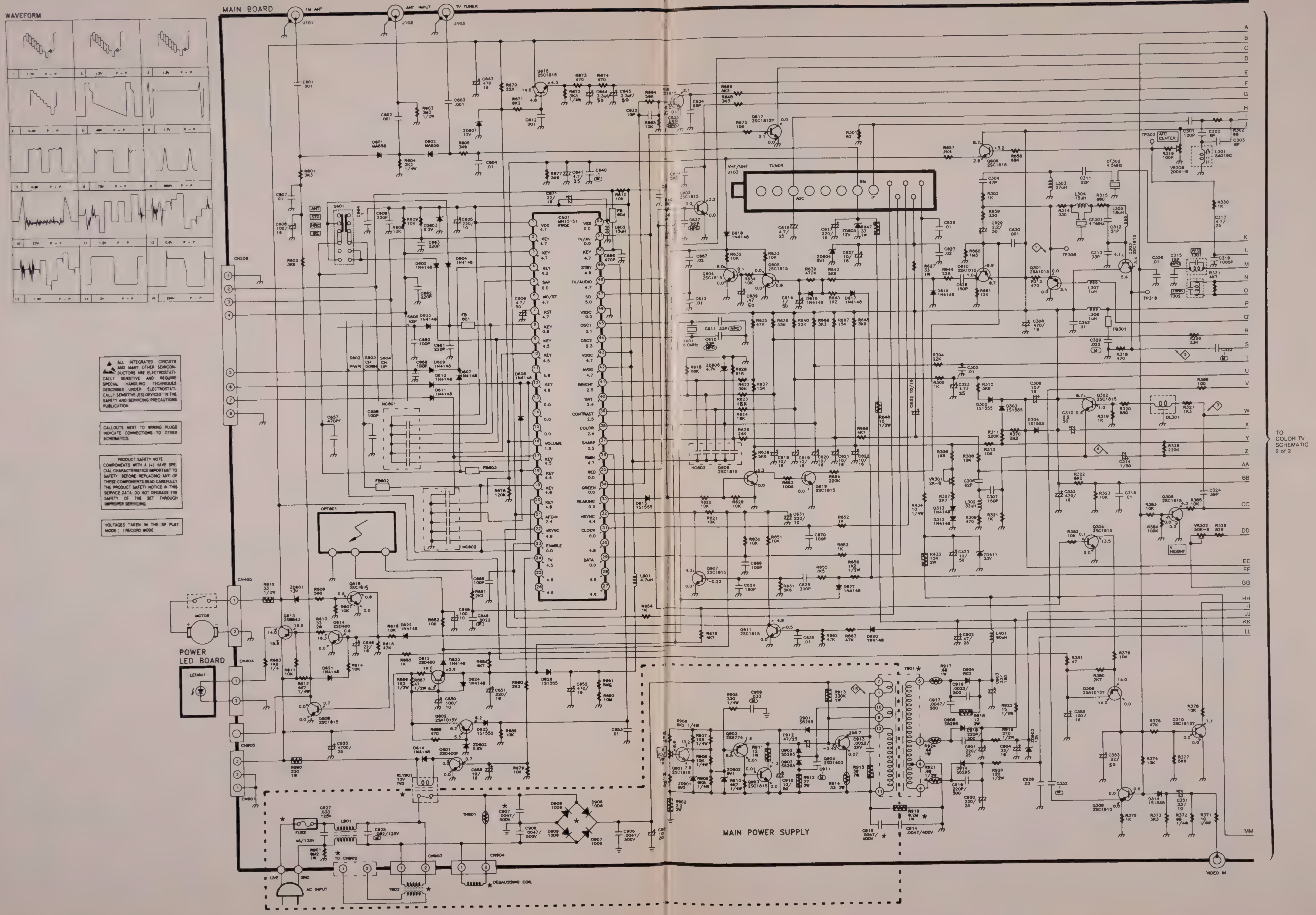
CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATICS

PRODUCT SAFETY NOTE
COMPONENTS WITH A (*) HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA. DO NOT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

VOLTAGES TAKEN IN THE SP PLAY MODE ( ) RECORD MODE



Thomson/RCA TV, AM Radio, Cassette Combo 7-7800A



ALL INTEGRATED CIRCUITS AND MANY OTHER SEMICONDUCTORS ARE ELECTROSTATICALLY SENSITIVE AND REQUIRE SPECIAL HANDLING TECHNIQUES DESCRIBED UNDER "ELECTROSTATICALLY SENSITIVE (ES) DEVICES" IN THE SAFETY AND SERVICING PRECAUTIONS PUBLICATION.

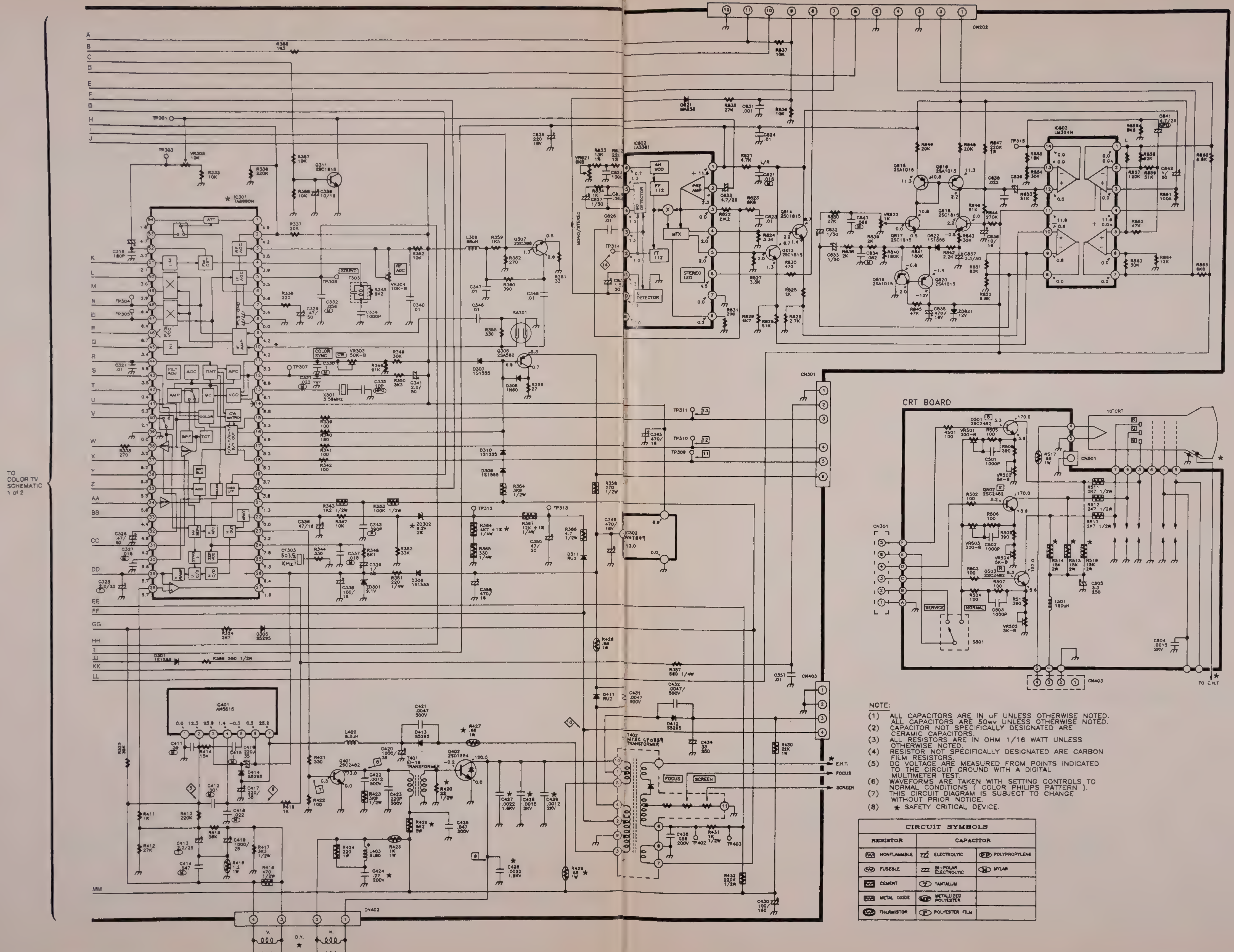
CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATICS.

PRODUCT SAFETY NOTE

COMPONENTS WITH A (*) HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA. DO NOT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

VOLTAGES TAKEN IN THE SP PLAY MODE ( ) RECORD MODE

TV Chassis



NOTE:

(1) ALL CAPACITORS ARE IN uF UNLESS OTHERWISE NOTED. ALL CAPACITORS ARE 50wv UNLESS OTHERWISE NOTED.

(2) CAPACITOR NOT SPECIFICALLY DESIGNATED ARE CERAMIC CAPACITORS.

(3) ALL RESISTORS ARE IN OHM 1/16 WATT UNLESS OTHERWISE NOTED.

(4) RESISTOR NOT SPECIFICALLY DESIGNATED ARE CARBON FILM RESISTORS.

(5) DC VOLTAGE ARE MEASURED FROM POINTS INDICATED TO THE CIRCUIT GROUND WITH A DIGITAL MULTIMETER TEST.

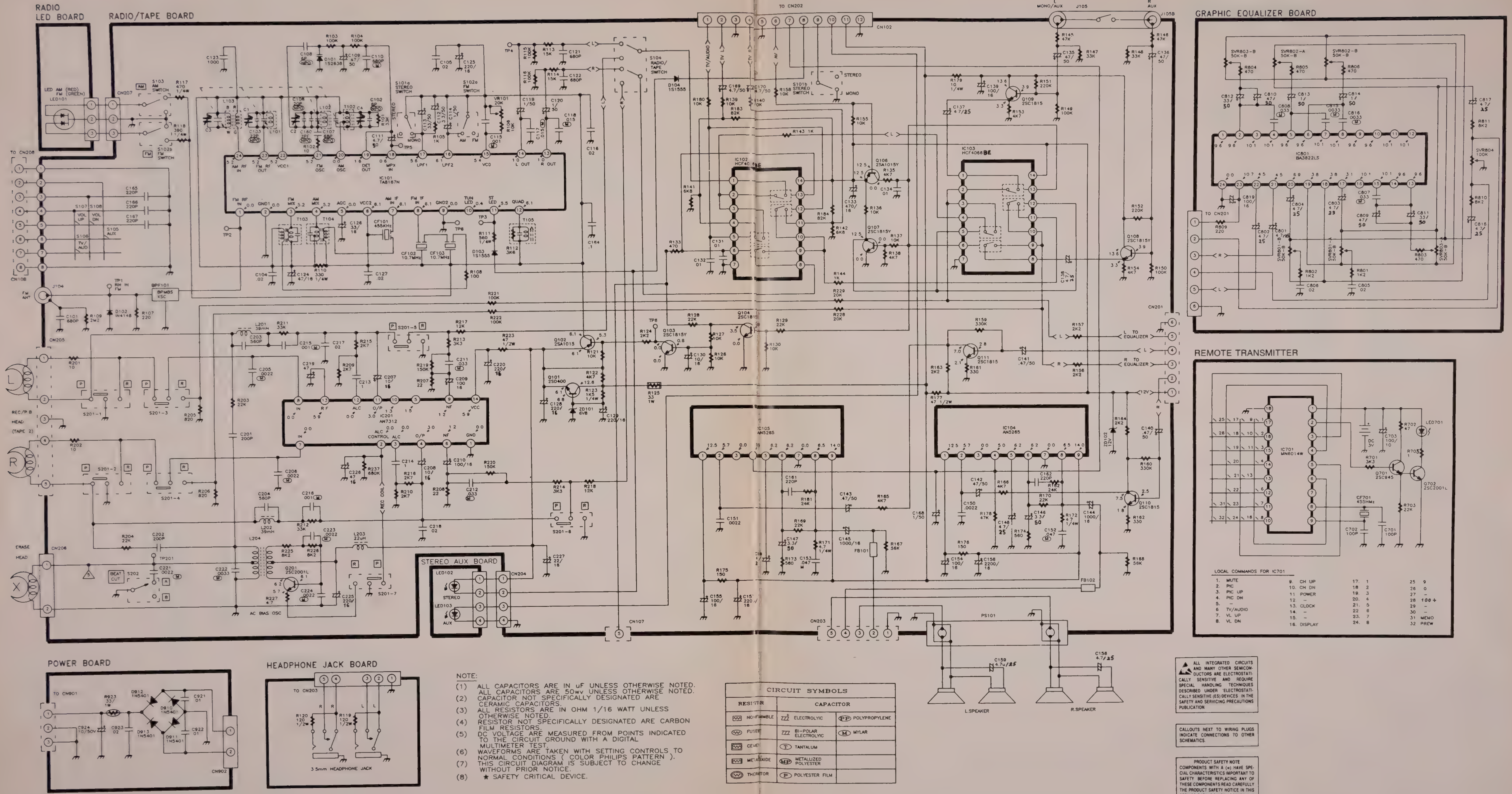
(6) WAVEFORMS ARE TAKEN WITH SETTING CONTROLS TO NORMAL CONDITIONS (COLOR PHILIPS PATTERN).

(7) THIS CIRCUIT DIAGRAM IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

(8) ★ SAFETY CRITICAL DEVICE.

CIRCUIT SYMBOLS		
RESISTOR	CAPACITOR	
NONFLAMMBLE	ELECTROLYIC	PP POLYPROPYLENE
FUSEBLE	BI-POLAR ELECTROLYIC	M MYLAR
CEMENT	T TANTALUM	
METAL OXIDE	MP METALLIZED POLYESTER	
THERMISTOR	P POLYESTER FILM	

AM/FM Radio, Cassette, Headphones, Power



NOTE:

(1) ALL CAPACITORS ARE IN uF UNLESS OTHERWISE NOTED. ALL CAPACITORS ARE 50wv UNLESS OTHERWISE NOTED.
(2) CAPACITOR NOT SPECIFICALLY DESIGNATED ARE CERAMIC CAPACITORS.
(3) ALL RESISTORS ARE IN OHM 1/16 WATT UNLESS OTHERWISE NOTED.
(4) RESISTOR NOT SPECIFICALLY DESIGNATED ARE CARBON FILM RESISTORS.
(5) DC VOLTAGE ARE MEASURED FROM POINTS INDICATED TO THE CIRCUIT GROUND WITH A DIGITAL MULTIMETER TEST.
(6) WAVEFORMS ARE TAKEN WITH SETTING CONTROLS TO NORMAL CONDITIONS (COLOR PHILIPS PATTERN).
(7) THIS CIRCUIT DIAGRAM IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.
(8) ★ SAFETY CRITICAL DEVICE.

CIRCUIT SYMBOLS		
RESISTOR	CAPACITOR	
NONFLAMMABLE	ELECTROLYIC	(PP) POLYPROPYLENE
FUSE	BI-POLAR ELECTROLYIC	(M) MYLAR
CEMENT	(T) TANTALUM	
METAL OXIDE	(MP) METALLIZED POLYESTER	
THERMISTOR	(P) POLYESTER FILM	

⚠ ALL INTEGRATED CIRCUITS AND MANY OTHER SEMICONDUCTORS ARE ELECTROSTATICALLY SENSITIVE AND REQUIRE SPECIAL HANDLING TECHNIQUES DESCRIBED UNDER 'ELECTROSTATICALLY SENSITIVE (ES) DEVICES IN THE SAFETY AND SERVICING PRECAUTIONS PUBLICATION

CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATICS.

PRODUCT SAFETY NOTE
COMPONENTS WITH A (∗) HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THIS SERVICE DATA. DO NOT DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING

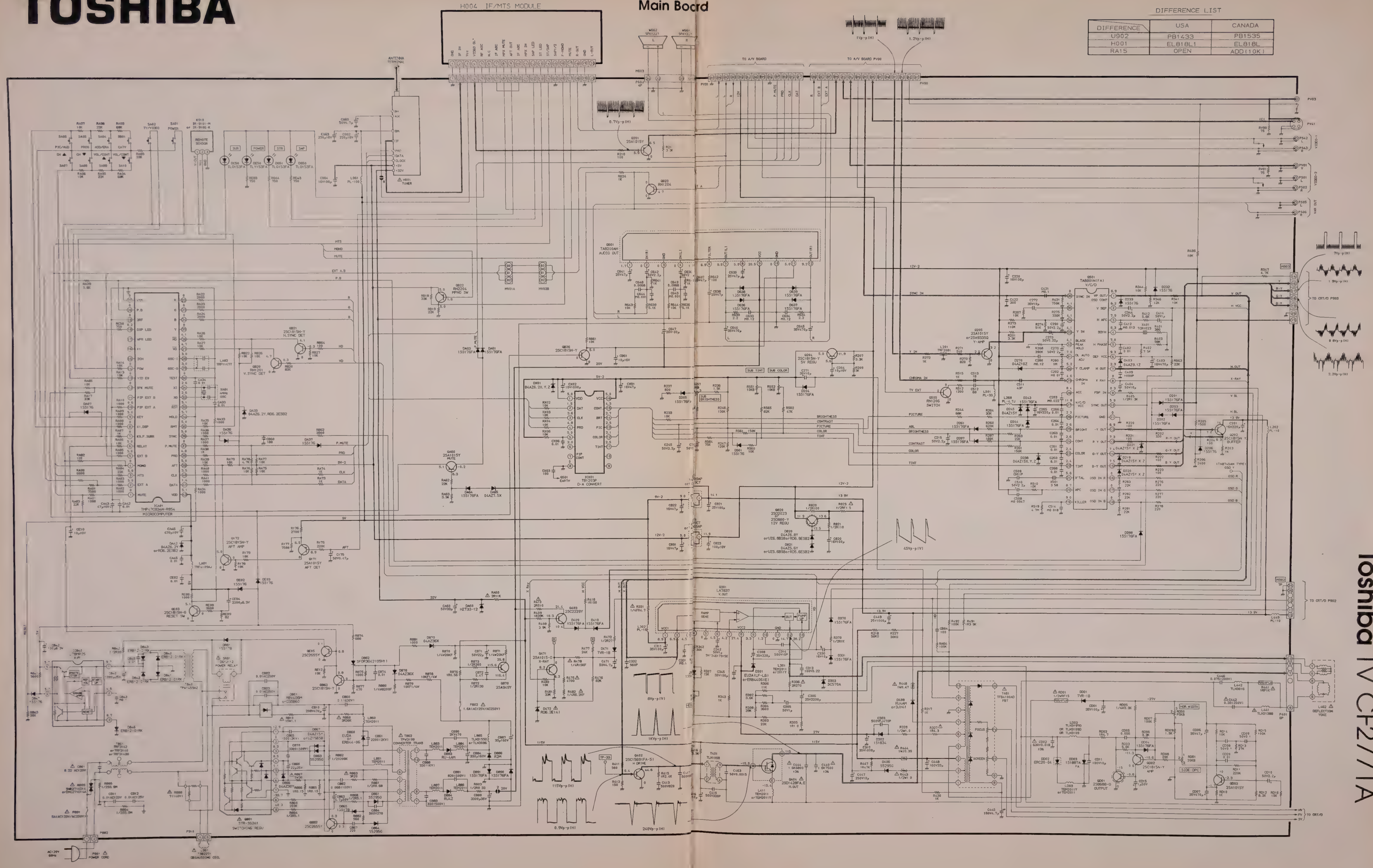
VOLTAGES TAKEN IN THE SP PLAY MODE ( ) RECORD MODE

TOSHIBA

Main Board

DIFFERENCE LIST

DIFFERENCE	USA	CANADA
U902	PB1433	PB1535
H001	EL818L1	EL818L
RA15	OPEN	ADD(10K)

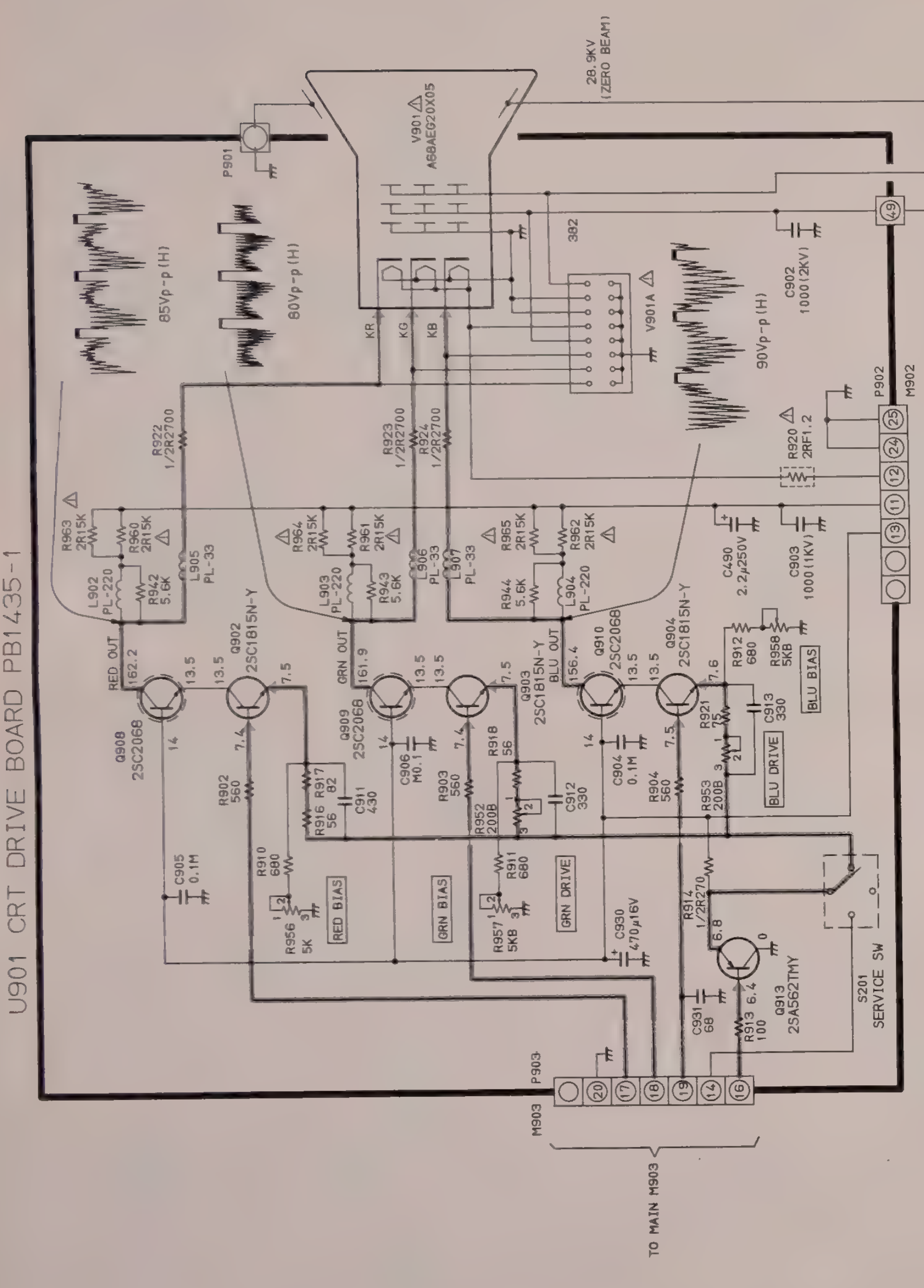


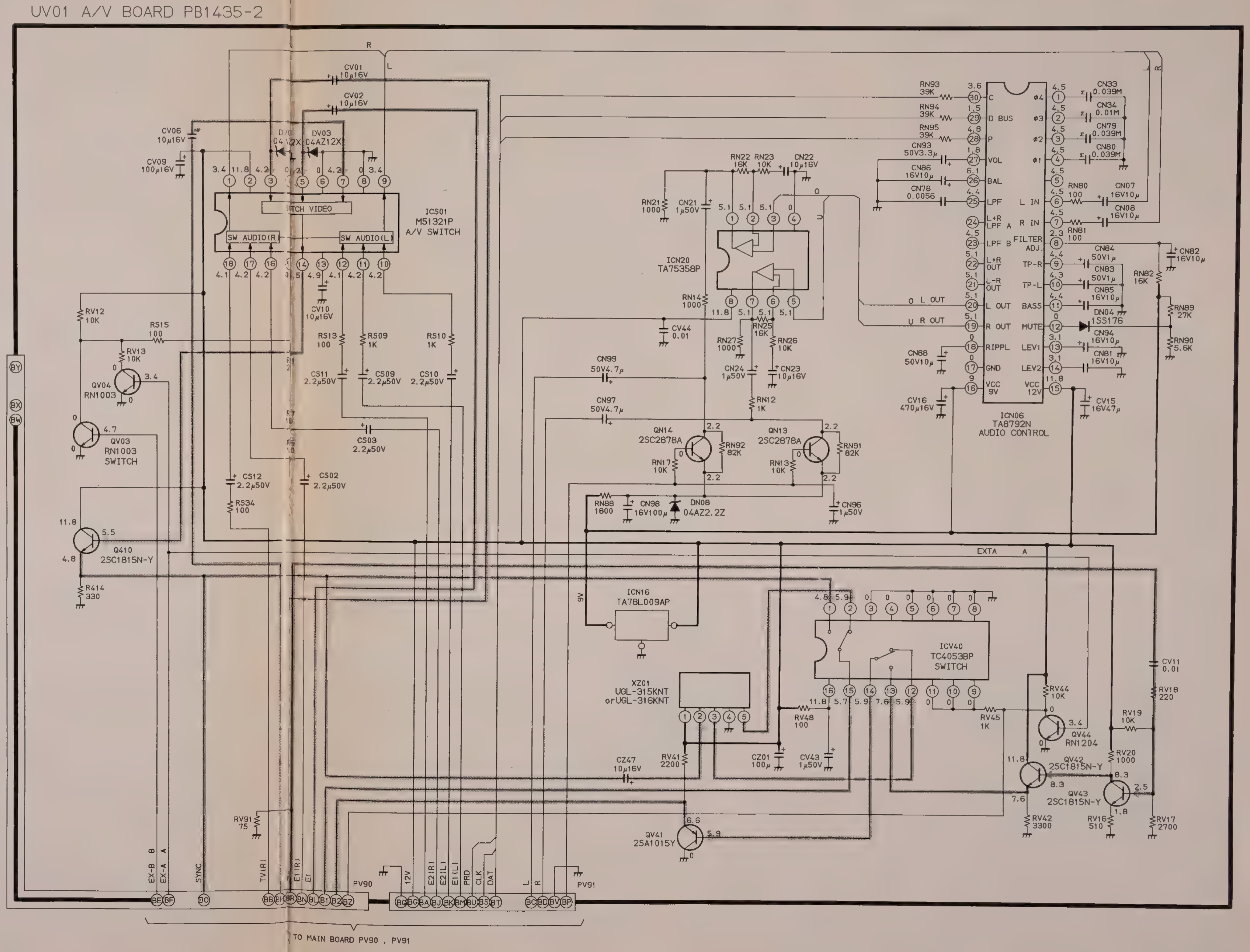
Toshiba TV CF2771A

CRT Drive Board, A/V Board

NOTE:

1. RESISTOR Resistance is shown in ohm [K = 1.000, M = 1.000.000]. All resistors are 1/6W and 5% tolerance carbon resistor, unless otherwise noted as the following marks.
   1/2R = Metal or Metal oxide of 1/2 watt   1/2S = Carbon compsistion of 1/2 watt
   1RF = Fuse resistor of 1 watt   10W = Cement of 10 watt
   K = ±10%   G = ±2%   F = ±1%
2. CAPACITOR Unless otherwise noted in schematic, all capacitor values less than 1 are expressed in μF, and the values more than 1 in pF.
   All capacitors are ceramic 50V, unless otherwise noted as the following marks.
   Electolytic capacitor   Mylar capacitor
3. The parts indicated with " △ " have special characteristics, and should be replaced with identical parts only.
4. Voltages read with DIGITAL MULTI-METER from point indicated to chassis ground, using a color bar signal with all controls at normal, line voltage 120 volts.
5. Waveforms are taken receiving color bar signal with enough sensitivity.
6. Voltage reading shown are nominal values and may vary ±20% except H.V.

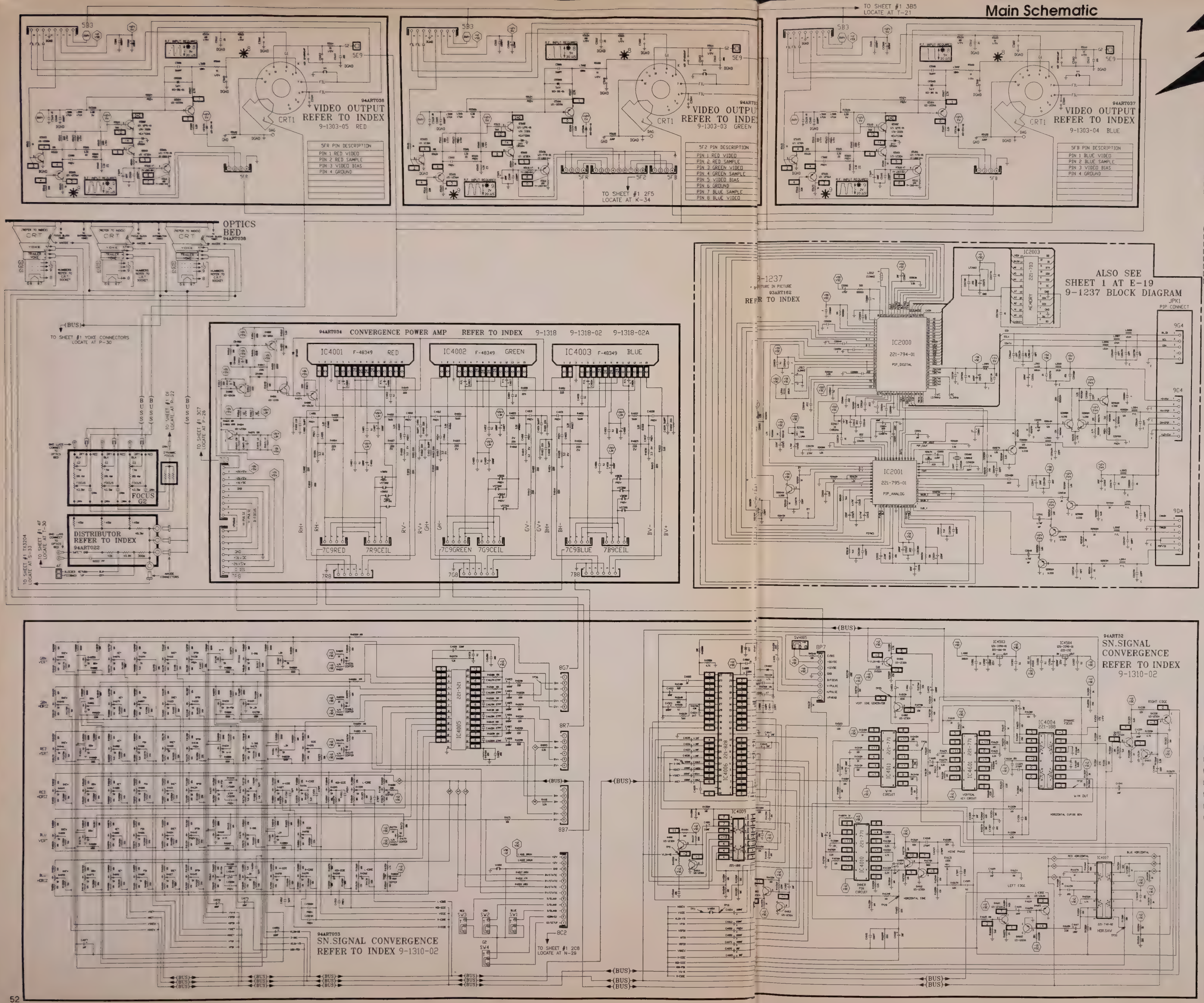


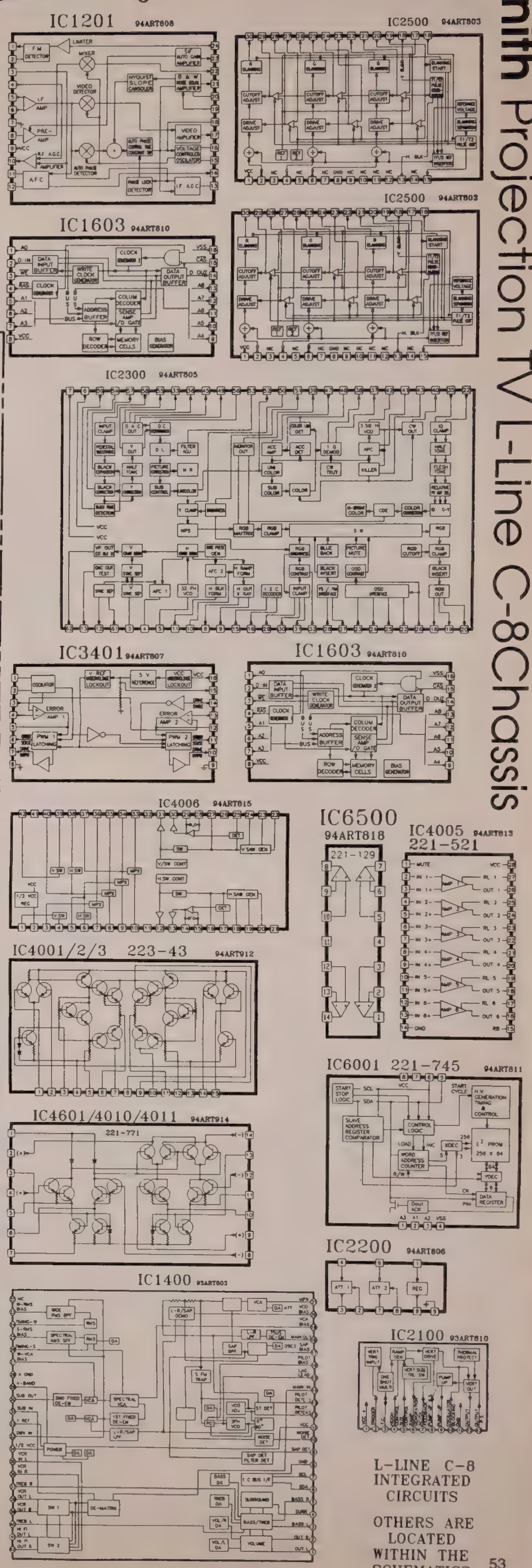


Main Schematic

ZENITH

Zennith Projection TV L-Line C-8Chassis

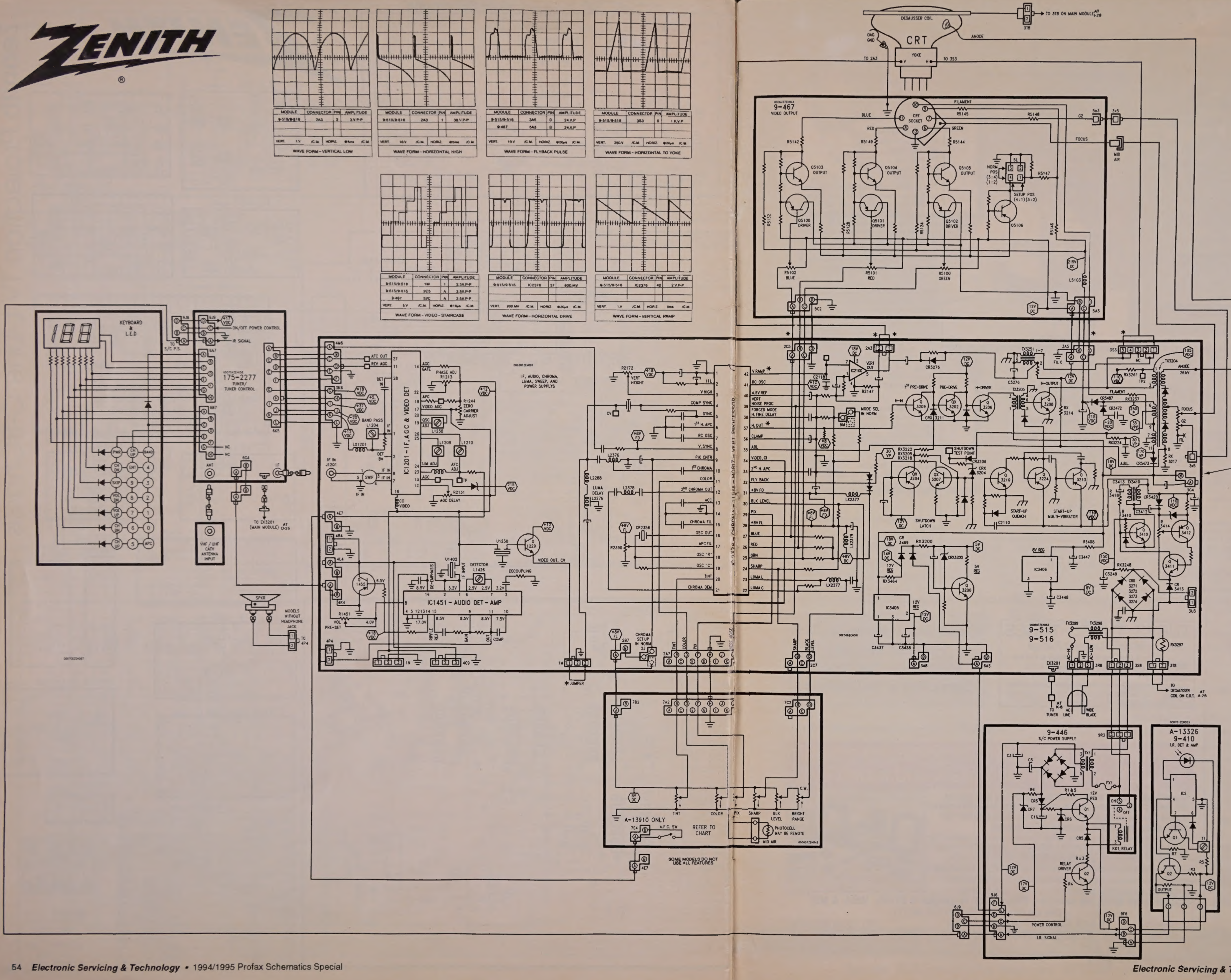




L-LINE C-8
INTEGRATED
CIRCUITS

OTHERS ARE
LOCATED
WITHIN THE
SCHEMATICS

ZENITH®



MODULE	CONNECTOR	PIN	AMPLITUDE
9-515/9-516	2A3	2	3.V.P-P
VERT. 1.V /C.M.	HORIZ. @5ms /C.M.		

WAVE FORM - VERTICAL LOW

MODULE	CONNECTOR	PIN	AMPLITUDE
9-515/9-516	2A3	1	38.V.P-P
VERT. 10.V /C.M.	HORIZ. @5ms /C.M.		

WAVE FORM - HORIZONTAL HIGH

MODULE	CONNECTOR	PIN	AMPLITUDE
9-515/9-516	3A5	D	24.V.P
9-467	5A3	D	24.V.P
VERT. 10.V /C.M.	HORIZ. @20μs /C.M.		

WAVE FORM - FLYBACK PULSE

MODULE	CONNECTOR	PIN	AMPLITUDE
9-515/9-516	3S3	5	1.K.V.P
VERT. 250.V /C.M.	HORIZ. @20μs /C.M.		

WAVE FORM - HORIZONTAL TO YOKE

MODULE	CONNECTOR	PIN	AMPLITUDE
9-515/9-516	1M	1	2.5V.P-P
9-515/9-516	2C5	A	2.5V.P-P
9-467	52C	A	2.5V.P-P
VERT. .5.V /C.M.	HORIZ. @10μs /C.M.		

WAVE FORM - VIDEO - STAIRCASE

MODULE	CONNECTOR	PIN	AMPLITUDE
9-515/9-516	IC2376	37	800.MV
VERT. 200 MV /C.M.	HORIZ. @20μs /C.M.		

WAVE FORM - HORIZONTAL DRIVE

MODULE	CONNECTOR	PIN	AMPLITUDE
9-515/9-516	IC2376	42	2.V.P-P
VERT. 1.V /C.M.	HORIZ. 5ms /C.M.		

WAVE FORM - VERTICAL RAMP

*WAVE FORMS
(AT PIN-OUT ADDRESS)

AC GROUND	⏚
DC GROUND	⏚
TO DC VOLTAGES	⬭
DC VOLTAGE SOURCE	⬡

FD = FILTERED DIGITAL
FL = FILTERED LINEAR

SYSTEM SCHEMATIC

A system schematic is a hybrid troubleshooting aid consisting of a functional block diagram and simplified module schematics. It provides an overview for tracing major circuits and includes these features: key voltages, the makeup of individual cables, all connections between modules and assemblies, major components and the main lines of interaction related to these components.

The intention of the system schematic is to provide sufficient information to analyze the TV as a system for determining which major component is faulty. For complete module and assembly schematics, refer to the appropriate service manual.

87A.R.T910

923-3042

By utilizing the peripheral coordinates of the system schematic the voltages and connectors may be quickly located on or near actual board layout (see example on reverse side of this sheet).

SEE EXAMPLE J 28 ON BOARD LAYOUT

Zenith Color TV Receiver
Models SD2501W, SD2509H, SD5533G, SD5553H, SS6503G, SS6505P, SS6507H

What's Your Best Servicing Value?

The magazine that makes money for you—*Electronic Servicing & Technology!*

Each month, ***ES&T*** brings you how-to service articles on TVs...VCRs...computers...CD players...microwave ovens... audio proucts and more. It's just the information you need to do your job everyday.

Regular columns and special features from experts will make you more efficient – and more profitable – in no time. Plus, our monthly PROFAX, a FREE 8-page pull-out of popular TV, VCR and computer schemaics, makes ***ES&T*** an even greater value.

Subscribe today to the only magazine devoted to *you*, the electronic servicing professional. You'll also receive the all-new **PROFAX SCHEMATICS SPECIAL** with over 50 pages of the hottest schematics – absolutely FREE!

Consumer Electronics Distributors

(from page 6)

Start International
3361 Boyington Suite 120
Carrollton TX 75006
214-960-1986
800-259-1987

Herman H. Sticht Co., Inc.
57 Front St.
Brooklyn NY 11201
718-852-7602

Tadiran Computer Batteries
21303 Sherman Way
Canoga Park CA 91303
818-887-3337

Taiko International
2272 Marina Boulevard
San Leandro CA 94577
510-895-2929
Fax: 510-895-2947

Tandy Distributor Sales
900 E. Northside Drive
Fort Worth TX 76102
800-322-3690

Targetronix
Div of Target Electrncs Corp
6551 Cochran Road
Solon OH 44139
216-248-7930

Techni-Tool, Inc.
5 Apollo Road
Plymouth Meeting PA 19462
610-825-4990

Telogy
150 Shoreline Drive
Redwood City CA 94065
800-835-6494

Thomson Consumer/ Svc Eng
600 N Sherman
Indianapolis IN 46201
317-587-4347

Time Motion Tools
12778 Bookprinter Place
Poway CA 92064
619-679-0303
Fax: 800-779-8171

The Current Source
5159 Glenwood
Boise, ID 83714
208-323-9692
Fax: 208-323-9691

The Tool Resource
PO Box 1106
W. Dundee IL 60118
708-468-0849

Toshiba America Consumer Prod.
Service Division
1420 Toshiba Drive
Lebanon, TN 37087
615-449-2360
Fax: 615-444-7520

Tri State Electronics
200 W. Northwest Highway
Mount Prospect IL 60056
708-255-0600
800-445-0896

Tritronics, Inc.
1306 Continental Drive
Abingdon MD 21009
301-676-7300
800-638-3328

Truminco
16745 Schoenborn Street
Sepulveda CA 91343
818-891-2345
800-331-0088

Tucker Electronics Co.
P.O. Box 551419
Dallas TX 75355-1419
214-348-8800
Fax: 214-348-0367

Union Electronics
16012 S. Cottage Drive
South Holland IL 60473
708-333-4100
800-648-6657

Video Display Corporation
1868 Tucker Indutrial Drive
Tucker, GA 30084
404-938-2080
Fax: 404-493-3903

Vintage TV and Radio Supply
3498 West 105th Street
Cleveland OH 44111
216-671-6712

Wholesale Electronics Inc.
123 W. First Avenue
Mitchell SD 57301
605-996-2233
800-351-2233

Zenith Sales Co.
A Div of Zenith Electronics Co
1900 N. Austin Avenue
Chicago IL 60639
312-745-2000

Consumer Electronics Manufacturers

(from page 4)

V-M Corporation
The Voice of Music
305 Territorial
PO Box 426
Benton Harbor, MI 49023
616-925-8841
This company no longer manufactures product, but manufactured large numbers of turntables under their own name, and for use in audio products of other manufacturers. If you ever need parts for a turntable that has 857 for the first three digits of the serial number, this is the company to contact. If you have any parts for these turntables, V-M corporation would like to talk to you about buying them.

Wells-Gardner Electronics Corp.
2701 North Kildare Avenue
Chicago, IL 60639
312-252-8220

Yamaha Electronics Corp. USA
Parts Department
6660 Orangethorpe Ave.
Buena Park, CA 90620
714-522-9105
Fax Orders: 800-634-0355

Yorx Electronics Corp
200 Executive Drive Suite 130
West Orange, NJ 07052
201-736-9555
Fax: 201-736-8180

Zenith Data Systems
2150 East Lake Cook Road
Buffalo Grove, IL 60089
708-808-4584

Zenith Electronics Corp./Videotech Corp.
1900 North Austin Ave.
Chicago, IL 69639
312-745-2000
Service: 312-745-5151

THE PROFESSIONAL MAGAZINE FOR ELECTRONICS AND COMPUTER SERVICING

ELECTRONIC
Servicing & Technology

1995/1996 Profax Schematics Special

Advertisers' Index

Anatek Corporation 7
Andrews Electronics 9
Electronic Design Specialists 3
Electronic Software Developers Inc. 9
Fluke Corporation ....BC
International Components Corp. 56
Philips Technical Training ....IBC
Premium Parts + ...5
RAM Software Enterprises 3
Sams, Howard & Company 8
Sencore ....IFC
TV-Man Tech-Tips, Inc. 7
Tentel Corp. 56

TUBES•TUBES•TUBES
World's Largest Range
Over 2,000 Types, Domestic & Foreign
VISA
UP TO 85% OFF Ask for price list
MasterCard
International Components Corporation
Toll Free 800-645-9154•N.Y. State 516-293-1500
107 Maxess Road, Melville, New York 11747

Order Back Issues of Our Popular Monthly Magazine *Electronic Servicing & Technology*

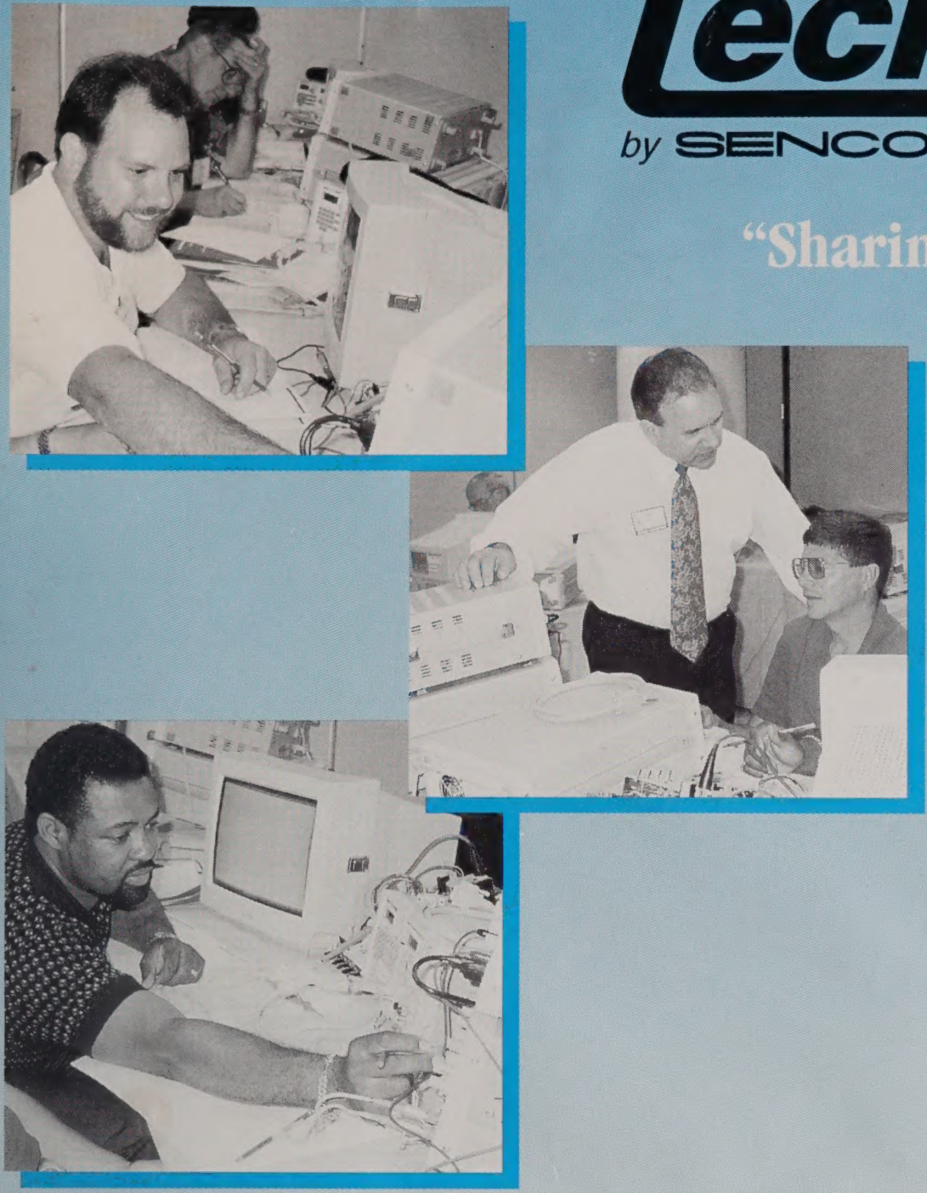
Would you like to STOP guessing about VCR problem diagnosis and repair?

More than 9 out of 10 VCR malfunctions are still due to mechanical problems, yet many servicers have little more than a needle nose pliers and a phillips screw driver for diagnosing and fixing mechanical problems.
Thousands of servicers already know the importance of measuring TAPE BACK TENSION, SERVO LINEARITY, TAKE UP TORQUE, FF & REW TORQUES, BRAKE TORQUES, REEL HEIGHTS, GUIDE HEIGHTS, CARRIAGE POSITIONING, HEAD WEAR AND MORE- Most measurements performed in SECONDS without guessing!! Guaranteed to help your profit on VCR repairs.

Gauges from $295; the essential 'PACKAGE' of gauges is $1150; VISA, & MC.
Call toll FREE 800-336-VCRS (8277)
TENTEL ® **4475 GOLDEN FOOTHILL PKWY.**
EL DORADO HILLS. CA 95762
Int'l : (916) 939-4005
24 hour FAX : (916) 939-4114

Tech Training™ by SENCORE

"Sharing Your Vision For Success"



Technical know-how is a service technician's most important tool. Today more than ever, a solid functional understanding, combined with proven effective troubleshooting techniques is essential to your success. But where do you get solid, well-rounded training? How do you learn good troubleshooting skills? To meet the growing demand for solid, fundamental, practical training, Sencore introduces Tech Training - training by technicians... for technicians.

Computer Monitor Servicing Course - TC100

(Approved for CEU credit)

This hands-on self study course teaches you how to efficiently test and troubleshoot as you work through the activities and self tests. You'll learn:

- How to quickly determine monitor types
- How to make all monitors look alike from the SMPS to the CRT
- What video patterns to use to accurately identify failures

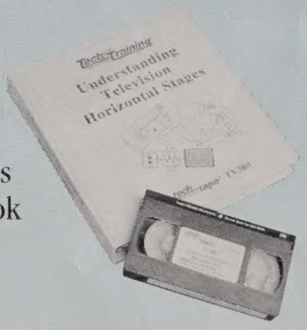
Computer Monitor Servicing Class - TC100T

(Approved for CEU credit)

This 3 1/2 day class provides hands-on experience on actual chassis. You'll learn how computer monitors work, typical circuit operation, how to make adjustments, and lots of practical troubleshooting. **Call for locations and dates**.

Understanding Television Horizontal Stages - TV300

The horizontal stages are the most complex, hardest working, and probably the highest failure part of a television receiver. Knowing how these stages work, how they fail, and how they interact with other circuits will help you conquer these difficult servicing problems. This training package includes a self-study workbook and a 45 minute video.



Tech Choice Technical Troubleshooting Demonstrations

Do you need a quick servicing refresher? No matter how you service, you'll take home valuable tips that you'll put into practice immediately. Choose from these practical demonstrations:

- Computer Monitor Troubleshooting
- Profitable TV Troubleshooting
- Simplified VCR Servicing
- Camera/Camcorder Testing & Troubleshooting

Check the city listing below for upcoming Tech Training locations:

Albuquerque • Atlanta • Baltimore • Birmingham (AL) • Boston • Buffalo • Calgary • Chicago • Cincinnati • Cleveland • Dallas • Detroit • Edmonton • El Paso • Houston Indianapolis • Kansas City • Knoxville (TN) • Los Angeles • Miami • New York City • Oklahoma City • Philadelphia • Phoenix • Pittsburgh • Raleigh (NC) • Reno San Diego • Seattle • Sioux Falls • Tampa • Toronto • Vancouver • *(Tentative list. Not all Tech Training classes will be held in all locations. Call for details.)*

Circle (1) on Reply Card

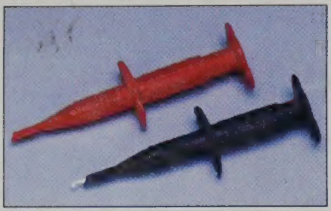
Call 1-800-SENCORE (736-2673)

Sencore, 3200 Sencore Drive, Sioux Falls, SD 57107 • Phone: (605) 339-0100 • FAX (605) 339-0317

6196

AC80 Hook-Style Test Clips

Safety-grip, spring loaded clips with hook grip.



- Nickel plated steel .400" x 0.080" (10mm x 2mm) hook.
- Rated 1000V, IEC 1010-1, Category III, Heavy Industrial Rating
- 3A current rating.
- Compatible with all test leads having standard-diameter safety shrouded banana plugs.
- UL 1244 listed
- Shown with TL22 Flexible Test Leads (not included)

List Price $17.00
Call 1-800-678-9548 for more information

23 Service Kit - For convenience and value

Save 10% over buying items separately

- A fully-equipped multimeter and accessory package, with application material.

List Price: $309
Call 1-800-678-9548
for more information

- Includes: Fluke 23 DMM
  C17Y Durable Case
  80I-400, 400A AC Current Clamp
  2-AC20 Industrial Alligator Clips
  2-TP20 Industrial Test Probes
  2-TL22 Silicone-insulated Flexible Test Leads
  3-Application Guides

80PK-8 Pipe Clamp Thermocouple Temperature Probe

Makes pipe measurements a snap.

Eliminates the need to tape probes to pipe surfaces to obtain accurate temperature readings.

List Price $99.00
Call 1-800-678-9548
for more information.

- Clamps around pipes from 1/4" to 1-3/8" in diameter.
- Rubbed construction with reliable sensor for long service life.
- Temperature range: -20°F to 300°F.
- Works with any temperature meter that has a Type K mini-connector.

True-rms. True values.

NEW

Do you troubleshoot non-linear circuits or loads? If so, you need true-rms capability to ensure accurate measurements. Now you can get this capability without having to compromise on quality or safety to stay within your budget.

Priced at just $199.00*, the new Fluke Model 76 true-rms DMM is the latest in the long line of true-rms values from Fluke. You can use the Model 76 to easily measure true-rms ac current and volts, dc current and volts, ohms, capacitance, continuity, and frequency. And, the Model 76 is the only DMM in its class that meets UL, CE, CSA, and TÜV certification standards and conforms to the IEC 1010-1 product safety standard for Overvoltage Category III.(1)

You'll find that kind of true value all the way down the line with Fluke test tools. See your local Fluke distributor to select a true-rms meter that fits whatever your job or budget demands.

Fluke 32
$149*

Fluke 33
$269*

Fluke 76
$199*

Fluke 87
$335*

Fluke 8060A
$459*

* U.S. list price. Prices subject to change without notice.

(1) Approvals/Listing pending

© 1995 Fluke Corporation P. O. Box 9090, M/S 250E, Everett, WA USA 98206-9090. U.S. (206) 356-5400. Canada (905) 890-7600. Europe (31 40) 644200. Other countries (206) 356-5500. All rights reserved.
Ad no. 00768

CE TÜV GS UL SA ISO 9001

FLUKE®

80i-kW Power/Current Probe

Measures true ac power and dc & ac current.

This battery-powered clamp-on probe connects to most multimeters, to measure true ac power (KW) plus dc and ac current without breaking the circuit.

- Measures power and current of sine waves and nonlinear waveforms when connected to a true rms meter.
- Thumbwheel zero control for accurate ac measurements.
- Wide Range: 1300A dc, 1000A ac, 330kW ac.
- Large oval jaw: 2-7/8" x 2-3/8" (73mm x 60 mm)
- Includes rugged, hard carrying case and instructions for single and 3-phase power measurements plus power factor calculations.

List Price $599.00
Call 1-800-678-9548
for more information

The Fluke 860 Series Graphical™ Multimeter

It's Six Instruments In One!

The Model 860 Series gives you state-of-the art multimeter capabilities coupled with a powerful waveform display, trend plotting, in-circuit component testing and logic activity.

- 4-2/3 digit, high accuracy true-rms or average responding multimeter
- 1 MHz DSO
- A classic, easy-to-use DMM rotary switch user interface
- TrendGraph™ Mode - an electronic chart recorder
- 10 MHz frequency counter, in-circuit component test, logic activity model (865/867)
- Internal NiCd or alkaline battery operation, optional line power
- Waveform memory (865/867)
- RS232 cable and adapters plus companion software
- Compliance with IEC 1010-1 Category III at 1000 volts
- GMM™ test tools start at $695 (suggested U.S. list). For a graphical demonstration, see your local Fluke distributor or call 1-800-59-FLUKE for a direct connection to a distributor near you. For immediate fax back of 860 literature, **call 1-800-86-FLUKE.**